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**DIAGNOSING AND TREATING
CHRONIC FATIGUE SYNDROME
(CFS)**

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INTRODUCTION

This book contains most of those things which chronic fatigue syndrome (CFS) patients must do to get well (don't miss out bits or you may fail!). All the tests I discuss are also available through my website. My aim is to give all CFS sufferers and their therapists the knowledge and the access to tests to get themselves on the road to recovery. At present I am overwhelmed with new patients and cannot see more. However, I now have an experienced team of secretaries who can certainly advise you on the basic work up and recommend appropriate tests. I can do a detailed letter to your GP explaining what action needs to be taken on the basis of such tests. If your GP is unable or unwilling to help with, say B12, magnesium, thyroid and adrenal function, then I can help by supplying some of the necessary, with the GP's knowledge. Or if you get to the stage when you need further help such as desensitisation I can refer you to a suitably qualified local practitioner, a list of which is at www.ecomed.org.uk Also in this book there is a list of Practitioners trained to treat CFS on p. 133

Since 1982 I estimate I have seen and treated over 4,500 patients with CFS. I now know that there is only one way to get well and that entails a whole package of treatment. That package of treatment has to be done in the right order – it is a little bit like building a house – there is no point putting the upstairs windows in until the foundations and walls are in place. Many patients come to me having tried thyroid or B12 injections or whatever, but **unless the diet, sleep, pacing and micronutrients are in place and correct, they won't see benefit.** I ask all my patients to tread this hard path because I know of no other way to get better. This requires a complete change in lifestyle and changes are hard to make, especially when the poor patient lacks the physical, mental and emotional energy to make these changes at all! Each patient has to become his own doctor, detective and psychotherapist to work out the best strategies for recovery. I can point patients in the right direction, provide the tests, information and therapies to get sufferers better, but there is only one person who can actually walk that path.

The basic package of treatment and approach to treatment is the same for everybody, but each person discovers a vital key or keys which really give them a quantum leap in improvement and may even be unique to them. For some people who are poisoned it is the detox regime that makes them better. For others, removing mercury amalgam opens the floodgates to recovery; thyroid hormones for many are an important factor. But there is no point putting the esoterics in place until the basics are done.

Recovery is never a smooth ride because life has a habit of getting in the way and throwing in extra stresses that you can do without. Whenever a hiccup occurs, always go back to the basics. People recover from CFS, firstly by getting their regime as tight as possible (with respect to diet, supplements, pacing, sleep and detox), then they start to feel better and only then should they start to increase their levels of activity. BUT if they get delayed fatigue, then reduce activity. Most people end up with a juggling act between how strict their regime is, how well they feel and how much they can do. The regime is for life – but once in place it substantially reduces risk of heart disease, cancer and degenerative conditions.

WHO AM I?

I have worked in NHS and private practice since qualifying from the Middlesex Hospital Medical School in 1981 (medicine with Honours). For 17 years I was the Hon Secretary of the British Society for Ecological Medicine (renamed from the British Society for Allergy, Environmental and Nutritional Medicine), a medical society interested in looking at causes of disease and treating through diet, vitamins and minerals and through avoiding toxic stress. I help run and lecture at the Society's training courses. I lecture regularly on organophosphate poisoning, the problems of silicone, CFS and so on. I am one of the medical advisers for Action For ME. I have had many appearances on TV and radio. I am a founder member of OPUS (organophosphate users support group) – a charity to help sufferers of pesticide poisoning.

I am a co-author of a scientific paper “Chronic fatigue syndrome and mitochondrial dysfunction” which has just been published (Jan 2009) in the International Journal of Clinical and Experimental Medicine – see <http://www.ijcem.com/files/IJCEM812001.pdf> This paper supports the fact that the mitochondrial function test is very useful because it gives an objective measure of fatigue which cannot be argued with.

I have two daughters, Ruth and Claire. My hobbies are anything to do with horses! In the winter I hunt, in the Spring and Autumn team chasing, occasional point to pointing and in the summer I go long distance riding. Below is a picture of me team chasing on my horse Mags! Love her!



A QUICK GUIDE TO FINDING WHAT YOU ARE LOOKING FOR

A message from the editor

Throughout the book you will come across words in capitals looking like this: MALABSORPTION. These are titles of information handouts which Dr Myhill considers to be useful and relevant to the topic under discussion – please, ask the office staff for a copy to be sent to you by post or by email, or look for it on the website, www.drmyhill.co.uk

Similarly, you will come across words looking like this: *Mitochondrial Function Profile*. They denote names of the various tests Dr Myhill discusses and recommends and which can be ordered from her website.

If you are reading this book in its electronic form (i.e. you received it as an email attachment) then there are certain tools available to you which will make moving around in this long document much easier. They are

- **Table of contents (TOC) and**
- **bookmarks.**

The entries in the *Table of contents* act as links to the relevant sections. You simply click on the title of the section you want to go to (or hold Ctrl button and click) and you will be transported to the required page.

Bookmarks do a similar job, but are even better, because you can jump to the section you want to read from any place in the document. I have bookmarked:

- the Table of contents,
- the beginning of each of the 6 Parts of the book

You can also add your own bookmarks while reading the book. To do this, position the pointer where you want the bookmark, from Insert menu select Bookmark, write the name of your bookmark (without spaces!) and click Add. Job done!

To use the *bookmarks* that already exist in the text, follow these instructions:

1. On the **Insert** menu, click **Bookmark** (quite low on the list of options).
2. Under **Bookmark name**, click the bookmark you want to go to (e.g. “PartI”, “TOC,”).
3. Click **Go To**.

“Word” software offers another clever feature for moving around in a long document. It is a little round button on the bottom right hand side of the screen (for the IT initiated, the little button is on the bottom of the vertical scroll bar and is called “Select Browse Object”). When you click on it, a little box pops up with a number of icons. If you click on the blue horizontal arrow, you can enter the page number you want to move to, and click Go To. Other ways of browsing are also worth exploring by clicking on the other icons.

At various places in the book I have also created cross-references to relevant sections further in the book. They appear as **bold page numbers** in brackets and behave as hyperlinks. This means that if you click on such a page number, you will be taken directly to that page.

PART I: THE CLINICAL PICTURE OF CFS



I have come to the view that CFS is simply a description of a group of symptoms with several causes, of which more than one may be present in any individual. Most patients present with CFS following a viral infection and therefore it has been assumed that viral infections cause CFS. I don't believe this is entirely right. I think people are predisposed to getting CFS, partly through genetic factors and partly by the way they live their lives. A viral infection just happens to be a powerful stress or trigger, i.e. “the last straw”, which tips them into CFS. I am increasingly seeing patients with CFS following exposure to toxic chemicals such as organophosphates, other pesticides, carbon monoxide, silicone breast implants and other such toxic chemicals which can also act as a powerful trigger. It is no coincidence that the increasing incidence of CFS parallels rising environmental pollution. I suspect that toxic chemicals damage the immune system so that it is unable to deal adequately with viral infections eventually leading to a CFS.

I treat CFS by working out the underlying nutritional, biochemical, immunological, toxic, hormonal, and lifestyle mechanisms that cause the symptoms and signs. A useful analogy in understanding the mechanisms of this illness and recovery is to compare the human body to a car. I will be using this analogy throughout the book.

If the body is a car, to get it to go you need:

- **Engine**
- **Fuel**
- **Oxygen**
- **Accelerator pedal**
- **Gearbox**
- **Service and repairs**
- **Cleaning - oil**
- **Cooling system**
- **Driver**
- **Mitochondria**
- **Diet/Nutrition**
- **Lungs**
- **Thyroid**
- **Adrenals**
- **Sleep**
- **Antioxidants**
- **Detoxification**
- **The brain**

Symptoms of CFS

My current understanding of CFS is that it is a symptom of *mitochondrial malfunction*. In Part II of this book I will explain the role of mitochondria, the biochemical processes inside each cell involved in producing energy, and I will show how many of the symptoms of CFS can be explained by mitochondrial dysfunction. Then the references I make here to mitochondria, ATP, ADP, cell-free DNA etc. will become much clearer. First, however, let us look at the clinical picture of the illness.

The two key symptoms in patients with CFS which I believe reflect the *mitochondrial dysfunction* are:

- very poor stamina (mental and physical) – i.e. you can do things, but only for about 5 seconds before tiring. This is due to slow recycling of ATP (see p.9).
- delayed fatigue (mental and physical) – i.e. symptoms persist for 24 - 96 hours if you over-do things. This is because when mitochondria are stressed, all the energy molecules (ATP, ADP and AMP) are drained out and cells have to wait 1-4 days for new energy molecules to be made via the pentose phosphate shunt.

These two symptoms are central to the diagnosis of CFS. The mental fatigue manifests as poor short term memory, inability to follow a line of argument, difficulty reading or watching TV, poor problem solving ability, difficulty dealing with more than one thing at a time – what I call foggy brain. As one of my patients put it: “*Nothing right in my left brain, nothing left in my right brain!*”

In additions to the above, there are common symptoms present in many cases. These symptoms are worsened when the patient overdoes things:

- malaise (ie a feeling of illness) – this is caused by damage to tissues when the sufferer overdoes things. In tests this is reflected by a high levels of cell-free DNA, which is a measure of tissue damage (cf. p. 17). See also INFLAMMATION.
- muscle pain - ditto – also caused by poor antioxidant status, early switch into anaerobic metabolism, or magnesium deficiency. See PAIN, FIBROMYALGIA, ALLERGIC MUSCLES, STIFF MUSCLES.
- muscle weakness (including the muscles in the eyes giving episodic, variable, blurring of vision),
- sleep disturbance (whereby the “biological clock” is moved on 1-6 hours and CFSs drop off to sleep late and wake late). CFS sufferers are natural owls.
- tendency to get recurrent infections – see VIRAL INFECTIONS – HOW TO AVOID
- a general hypersensitivity to noise, light, touch, pain, smells etc
- drug and alcohol intolerance – a small drink gives a big hangover. Indeed intolerance of many drugs is common especially to antidepressants, beta blockers, statins and blood pressure medication. This may reflect poor detoxification pathway with stressing of the P450 enzymes and an out-pouring of free radicals. However many of these substances inhibit mitochondria directly or worsen the already struggling low cardiac output. See DETOXIFICATION
- feeling of “not being with it”
- poor temperature control
- gut symptoms: ALLERGY, HYPOGLYCAEMIA, GUT DYSBIOSIS, HYPOCHLORYDRIA, YEAST PROBLEMS, MALABSORPTION, POOR PANCREATIC FUNCTION, HYDROGEN SULPHIDE, FERMENTATION IN THE GUT.
- headache,
- mood swings – see BRAIN IN CFS – EDGE EFFECT
- joint pain – see NUTRITIONAL TREATMENT OF ARTHRITIS, OSTEOPOROSIS

There are usually few physical signs. Sometimes there are tender trigger points in muscles and tendons, sometimes signs of inflammation such as swollen tender lymph nodes in the neck or low-grade fever. However, often there are no obvious abnormalities on physical examination – indeed, the patient may look reasonably well.

Depression is not part of CFS but can arise in any patient who has been chronically ill with “no light at the end of the tunnel”. The main cause of depression in CFS patients results from bad treatment by their physicians. It appals me that so many physicians feel able to send their patients away with no coherent sensible management plan or glimmer of hope for the future.

The question can be asked as to what causes mitochondrial malfunction. This may occur for many reasons:

- Genetic – CFS runs strongly in families, usually down the female line. This is because all our mitochondria are inherited from our mothers. I see many mother-daughter, mother-son combinations both with CFS but rarely father-daughter, father-son combinations. An indicator of genetically poor mitochondria comes from asking how one fared at the school cross country run - most of my patients staggered to the school gate and walked the rest looking with disbelief at the others disappearing into the distance! Having said that I also see a group of people who have been serious athletes and get into CFS through over-training.
- Direct damage by viral stress or toxic stress (such as pesticides, carbon monoxide and fumes from burnt hydrocarbons, heavy metals, volatile organic compounds, silicones etc). This includes damage because of recreational drugs and prescription medication, especially the Pill, HRT, statins.
- Inability to resist toxic or viral stress because of poor nutritional and antioxidant status
- Nutritional deficiencies – so the body biochemistry goes slow. Risk factors for this would be a history of anorexia or bulimia, heavy drinking, poor quality diet
- The natural ageing process (which damages mitochondrial DNA). This process, however, can be slowed down with proper nutrition and lifestyle. I expect to suffer fatigue when I am in my eighties or nineties but not before!
- No time for healing/repair - Sleep disturbance, such as shift work, and chronically insufficient sleep is undoubtedly a major risk factor for CFS. SLEEP

Any or all of the above problems can result in:

- Acquired metabolic dyslexias – ie we get less good at making certain key molecules such as D-ribose and co enzyme Q 10. – Mitochondrial Function Profile
- Damage to DNA – the blueprint for making these components is damage – Tests: DNA Adducts. TOXINS block mitochondrial function, eg prescriptive drugs, alcohol, pesticides, volatile organic compounds (VOCs), heavy metals. Useful tests: Translocator protein studies, Microrespirometry studies
- Damage from free radicals – see ANTIOXIDANTS Antioxidant status
- Hormonal imbalances – Thyroid function profile, Adrenal stress profile
- Poor energy supply – STONEAGE DIET, MALABSORPTION, Short chain fatty acids, Fructose intolerance
- INFLAMMATION

REMEMBER: CFS is a symptoms and not a diagnosis. CFS is just the clinical picture. Something causes CFS and all its symptoms. Also remember that fatigue is a protective symptom! It prevents you from damaging your body doing too much! We all get this at the end of the day and sleep to recover. You ignore the symptom of fatigue at your peril!

Useful medical tests for investigating the patient who presents with chronic fatigue

One of the things I really dislike about the Medical Profession is their power over patients. The main two ways in which they use that power is firstly by controlling the availability of tests and secondly through the power of prescription. My website www.drmyhill.co.uk allows patients to order any test they see fit. The test result comes to me as the referring practitioner; I can interpret it and write to their GP with recommendations (copy to patient). Secondly, nearly all my treatments do not require prescription drugs and so are available to all. I can also recommend a local ecologically trained physician who can advise further if necessary.

There is no simple test currently available to diagnose CFS because CFS is not a diagnosis – it is a symptom. Blood tests merely serve to exclude other diagnoses. Doctors can sometimes be very naughty – they do the routine tests which all come back as normal and the doctors then turn round and tell their patient that nothing is wrong with them. I believe that the reason so many medical tests are negative in the case of CFS patients is because doctors are looking in the wrong place. The pathology is inside cells, i.e. in mitochondria. Although cells (and therefore organs) look fine, they do not function properly. It is a bit like having a car with a flat battery – an MRI scan of a car would come back completely normal – but you try and start it and nothing would work!

However, I now believe CFS is very often a symptom of mitochondrial failure. This means when other causes have been excluded (lack of sleep, allergy, hormonal problems etc) we now have a definitive test which can tell us how disabled the CFS sufferer is, where the biochemical lesion lies and what has to be put in place to correct it. Having said that, various routine blood tests have a place in investigating a patient with fatigue and so let's review them first.

Firstly exclude macroscopical pathology

Most patients, by the time they get to see me, have had all the routine tests done. These tests just test for macroscopic pathology such as major organ failure (anaemia, heart disease, cancer, liver failure, kidney failure and some gut problems). They do not test for minor organ failures (such as partial thyroid gland failure, partial adrenal gland failure, mild liver damage, poor ability to detox). None of these tests look for poor function of the brain or brain damage, nutritional tests are often absent or limited, hormone tests are usually incomplete and there are virtually no tests of micropathological function.

Having said that, there are often mild abnormalities in standard tests which have not been picked up on by the GP or consultant, but which are clinically important for the CFS sufferer. Results are given by a figure and there should also be a reference range next to this figure – that tells you if you are inside or outside the reference range. This reference range often varies from one lab to another.

The basic tests that most doctors do for their patients with chronic fatigue are:

- Haematology (full blood count – red cells, white cells and platelets)
- Inflammation in the blood – ESR, C reactive protein, plasma viscosity.
- Biochemistry (liver and kidney function)
- Blood sugar level
- Urine testing (for infection or kidney damage)
- Faecal occult bloods (looking for bleeding from the gut)

- Thyroid stimulating hormone (only looks for primary thyroid failure – most thyroid problems in CFS are secondary to poor pituitary function)
- Ferritin (iron), B12, folic acid and calcium
- Perhaps a serum magnesium – which is a completely useless test! This is because serum levels are maintained at the expense of levels inside cells. A serum magnesium is just an ITU (**Intensive Therapy Unit**) test!
- Autoantibody tests for autoimmunity.

Common abnormalities that can be shown by routine tests

The mild abnormalities I always look for in CFS in the above tests are:

- Low or low normal white cell count – can be a sign of poor immune function which most commonly is secondary to nutritional deficiencies, such as low zinc, low magnesium, low B vitamins, low essential fatty acids.
- Low or low normal platelet count – can be a sign of toxic stress
- Low MCV (mean corpuscular volume) suggesting iron or copper deficiency. Low iron is suggestive of HYPOCHLORHYDRIA, in which case other mineral deficiencies are also likely.
- High MCV suggesting B12, folic acid or HYPOTHYROIDISM
- A high blood sugar or a low blood sugar suggests there may be a tendency to HYPOGLYCAEMIA (a pre-diabetic tendency). A normal blood sugar tells you very little! Normal ranges of blood glucose have been changed because so many people now have carbohydrate intolerance. A normal blood sugar should be between 4-6mmol/l. High blood sugar is now associated with toxic stress because chemicals cause insulin resistance.
- Low potassium. Potassium varies according to diet! Low potassium means there is a lack of vegetables in the diet. Bananas may be rich in potassium but they are high glycaemic index, so beware!
- High normal bilirubin – may be Gilbert's syndrome suggesting poor ability to detoxify.
- High normal or abnormal liver enzymes – suggesting liver damage, usually from chemicals, or poor nutritional status.
- High urea or creatinine suggesting dehydration
- Low urea or creatinine suggesting low protein diet
- Low glomerular filtration rate suggesting poor kidney function – could be due to allergy or toxic damage but may indicate poor mitochondrial function.
- A TSH tells you very little about thyroid status! It is essential to see the actual level of thyroid hormones in the blood.
- Low levels of B12 can be due to HYPOCHLORHYDRIA or MALABSORPTION
- High uric acid can point to poor ANTIOXIDANT status. See GOUT.
- Raised cholesterol could mean low levels of vitamin D or hypothyroidism.
- Low levels of calcium likely to mean low levels of vitamin D.

The routine tests which I nearly always do initially and which have important implications for management

1. *Mitochondrial function profile* (p. 17) – this is a batch of tests to identify the mitochondrial problem. This test has important implication for treatment; this test includes:

ATP profiles – looks at levels of ATP, how well energy is released from ATP, the rate of production of ATP from ADP and movement of ATP and ADP across mitochondrial membranes

(translocator protein function - could be blocked by toxins or pH changes). Also gives us an objective measure of the level of disability.

Plasma cell-free DNA – a measurement of cell damage and antioxidant status in CFS

Red cell NAD levels – a measure of the efficiency of Krebs's citric acid cycle. Levels can be corrected with niacinamide 500mgs daily and acetyl L carnitine.

Co-enzyme Q10 levels – the most important antioxidant inside mitochondria. In CFS levels are nearly always deficient

Superoxide dismutase – three types measured, indicates levels of zinc, copper and manganese, also gene studies to give an indication of toxic damage. SODase is a major antioxidant in all cells.

Red cell magnesium – done as part of the ATP profile or can be done separately.

Glutathione and glutathione peroxidase (also indicates selenium status).

2. *Thyroid function profile (free T4, Free T3 and TSH).*

More esoteric tests which have implications for management

- *Microrespirometry* - looks in detail at ADP to ATP conversion (see sample result on p. 20)
- **Further investigation of poor translocator protein function** *Translocator protein studies* (p.21)
- **Cardiolipin studies looks at the structure of mitochondrial membranes** (p. 22)
- **Calcium studies** – calcium levels inside cells often too high.
- **Adrenal stress profile** – salivary levels of cortisol and DHEA over 24 hours
- **Salivary Melatonin levels** – it is common to get poor melatonin production and therefore poor sleep in CFS. This is a further reflection of the inadequate HPA axis in CFS.
- **Lactate dehydrogenase studies** – if there is evidence of cell damage, this indicates where the damage is coming from eg liver or muscle.
- **Red cell Carbonic anhydrase** – indicates hyperventilation

When gut symptoms suggest tests

- **Gut fermentation test** – to look for evidence of fermentation by bacteria or yeast. Irritable bowel syndrome may be caused by food allergy or gut dysbiosis. Low levels of short chain fatty acids can mean insufficient probiotics in the gut.
- **Salivary VEGF test** for hypochlorhydria – if there are symptoms of poor digestion or “too much acid”.
- **Urine hydrogen sulphide test** – some people ferment food to produce hydrogen sulphide and this can inhibit mitochondrial function. See HYDROGEN SULPHIDE AND CFS, FERMENTATION IN THE GUT AND CFS
- **Parasitology** at the London School of Hygiene and Tropical Medicine – detects worms, amoebae, giardia, blastocystis hominis.
- **Comprehensive Digestive Stool Analysis** – ability to digest and gut flora. Parasitology can also be done as part of this test.
- **Short chain polypeptides** – if the result is abnormal, it suggests leaky gut syndrome.
- **Early morning Short chain fatty acids and/or tests of Fructose intolerance** – indicate a tendency to HYPOGLYCAEMIA

Looking for toxic stress

- *Fat biopsy* for *pesticides* and/or for *volatile organic compounds* (VOCs). A fat biopsy is very easy to do – easier than a blood test! A green needle and 10ml syringe is used – the green needle is pushed into buttock fat, suction applied with the syringe, then needle withdrawn. The amount of fat inside the bore of the needle is sufficient to do the test.
- Sauna sweat test.
- *Kelmer test* (urine test) for mercury load – anybody with mercury fillings will have mercury on board – the question is how much? How hard does one have to work to get rid?
- Translocator protein **studies**.
- *DNA adducts* – looks to see if toxins have stuck onto DNA – if so, this is a pre-cancerous condition. This is a useful test to work out how much damage has been done to the body as a result of toxic stress and therefore how much work has to be put into a detox regime. If abnormal then it should be repeated following a detox regime to make sure there are improvements.
-

Looking for sensitivity to chemicals

- *Lymphocyte sensitivity* test for chemicals, heavy metals, silicones, VOCs. This is helpful if you suspect that you are reacting to one/some/all of those substances, in other words you are sensitive to them. I often use this where there is a silicone implant to help decide if it should be removed. Where there is sensitivity, there will be toxicity, and vice versa. Indeed, multiple chemical sensitivity is usually triggered by toxicity.

More recently John McLaren-Howard has developed similar tests to diagnose electrical sensitivity.

Evidence of damage to cells

- *Plasma cell-free DNA* – this is nearly always abnormal in CFS and can be for any one of the following reasons:

There is poor antioxidant status (see *Co-enzyme Q10*, *SODase*),

There is ongoing toxic stress (such as from pesticides, volatile organic compounds, heavy metals etc),

There is immune activation (as for example in acute infection),

There is very poor mitochondrial function (see mitochondrial function) score but the patient is forced to do some muscular activity just in order to live.

The patient is not pacing well – i.e. pushing too hard and this is resulting in cell damage. However some people who are very disabled have no choice – just the energy required to exist will cause tissue damage. So people with the worst mitochondrial function score often have high cell free DNAs even though they are doing almost nothing.

This can be investigated further with LDH studies, which tells us where the damage is coming from.

Tests not worth doing either because the result is worthless or the test is unreliable

- Tests for food allergy – at best these are 70% accurate.
- B12 – occasionally picks up pernicious anaemia, but regardless of the level I almost routinely prescribe injections to improve fatigue syndromes. B12 provides “instant” antioxidant cover. It has no toxicity. I like to see blood levels above 2000 (at this levels many GPs recommend stopping treatment!).
- Hair analysis – does not reliably detect heavy metal toxicity and can be very misleading with trace elements. Useless for allergies.

There is no point doing the tests I list below before starting nutritional supplements. This is because deficiencies are pandemic!

- B vitamin profile
- Red cell Magnesium
- Essential fatty acids
- Vitamins A, C and E
- Vitamin D3 levels (a bit expensive!)

There is no point doing a test unless it has implications for management – either one needs the test to make the diagnosis or to determine management options. Always ask this question when requesting a test or it is money wasted!

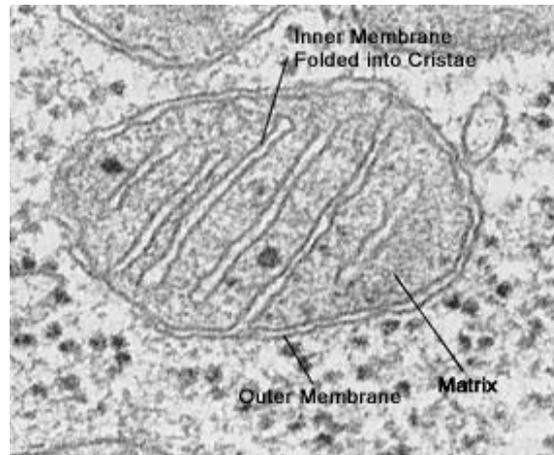
Tests ask very specific questions – there are literally hundreds of tests available, it is a case of picking the right one dependent on the symptoms and signs. If your doctor does not ask the right questions with his tests, then the results will not be relevant to recovery.

Where there are symptoms pertaining to a specific area such as the gut, tests need to be done to exclude ulcer disease, gall bladder disease, cancer and so on.

My general principle for tests of nutritional status is that I always advise sufferers to continue with their usual nutritional supplement programme when doing a test of nutritional status. This way I can assess if the current nutritional regime is adequate or not. I simply need to know what the patient is taking when interpreting such tests of nutritional status.

In CFS the problem is micro-pathology (intracellular, immune and biochemical problems), i.e. problems inside cells and on cell membranes. This is why standard medical tests do not come up with abnormalities.

PART II: MITOCHONDRIA AND CHRONIC FATIGUE SYNDROME



Mitochondria - the engine of the car

THEY SUPPLY ENERGY TO EVERY CELL IN THE BODY. WHEN MITOCHONDRIA GO SLOW, EVERYTHING GOES SLOW!

I think this is one of the most important ideas I have come up with in terms of my understanding of CFS and what to do in order to recover! So please read this very carefully and several times over because for many sufferers it contains the keys to unlock their illness!

We are made up of lots of different cells – heart, blood, muscle nerve cells etc. All these cells are different because they all have a different job of work to do. To do this job of work requires energy. But the way in which energy is supplied is the same for every cell in the body. Energy is supplied to cells by mitochondria. I think of them as little engines which power every cell in the body. Mitochondria are a common biological unit across the animal kingdom. The mitochondria in my dog, my cat and my horse are exactly the same as my mitochondria.

The job of mitochondria is to supply energy in the form of a chemical compound called adenosine triphosphate (ATP)). This is the universal currency of energy. It can be used for all sorts of biochemical jobs from muscle contraction to hormone production. When mitochondria fail, this results in poor supply of ATP, so cells go slow because they do not have the energy supply to function at a normal speed. This means that all bodily functions go slow.

Chronic fatigue syndrome, therefore, is a symptom of mitochondrial failure and every cell in the body can be affected.

I believe that it is vital that anyone with chronic fatigue understands how energy is produced in the body and what can go wrong in that process. This understanding will help CFS patients to take control of their recovery. The chain of biochemical reactions which takes place inside each cell and its mitochondria and which results in the release of energy is referred to as cell respiration. These reactions are complex and require oxygen.

Proteins, fats and carbohydrates are digested and absorbed in the gut and largely stored in the liver so that glucose can be released into the blood stream at a moment's notice. Glucose enters cells and is converted into acetate which is shunted into mitochondria by acetyl L carnitine. Acetate, as pyruvate, enters Krebs's cycle. Krebs's cycle generates activated NAD (vitamin B3) as NADH which is used to drive the process of oxidative phosphorylation – this is the process which recycles ATP.

ATP is picked up by translocator proteins which sit on the surface of mitochondria and move it out into the cell where it is needed to energise cell activity. ATP (adenosine with 3 phosphate groups) is converted to ADP (adenosine with 2 phosphate groups) with the release of energy for work. ADP then passes into the mitochondria, courtesy of translocator protein, where it is recycled back to ATP by **oxidative phosphorylation** (i.e. a phosphate group is stuck back on). ATP recycles approximately every 10 seconds in a normal person – if this goes slow, then the cell goes slow and so the person goes slow and clinically has poor stamina ie CFS.

Figure 1 is a simplified illustration of that cycle taking place inside every cell:

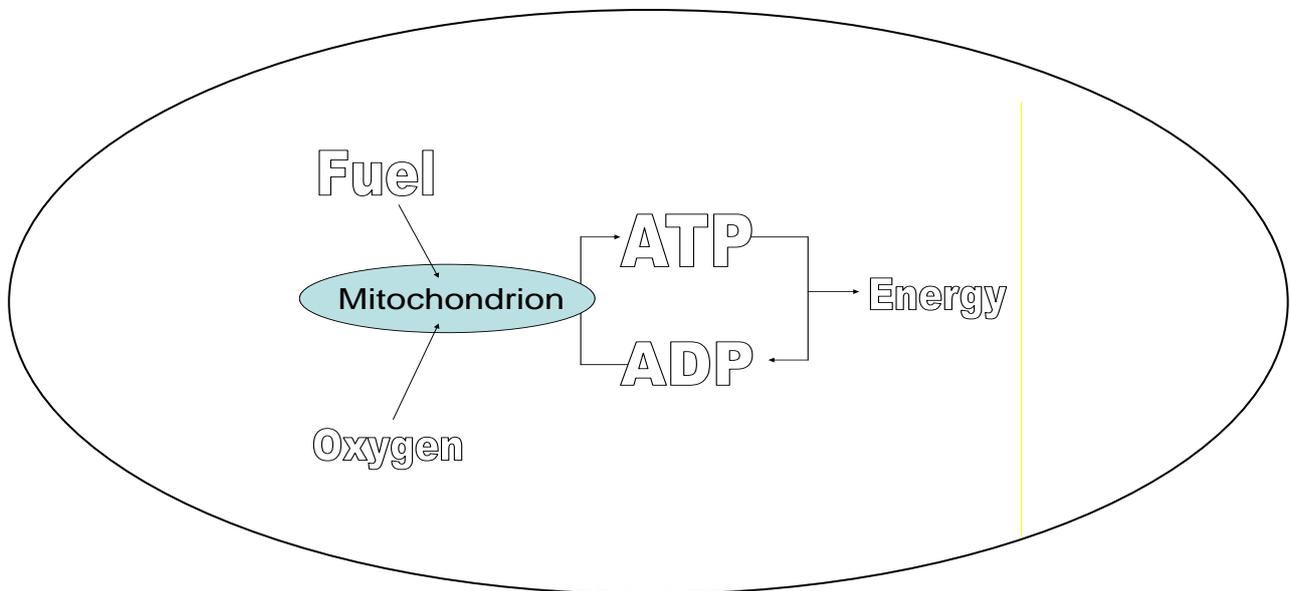


Figure 1

Problems arise when the system is stressed. If the CFS sufferer asks for energy faster than it can be supplied, (and actually most CFS sufferers are doing this most of the time!), then ATP is converted to ADP faster than it can be recycled. This means there is a build up of ADP. Some ADP is inevitably shunted into adenosine monophosphate (AMP -1 phosphate). But this creates a real

problem, indeed a metabolic disaster, because AMP, largely speaking, cannot be recycled and is lost in urine.

Indeed, this is the biological basis of poor stamina. In the long term one can only go at the rate at which mitochondria can produce ATP. If mitochondria go slow, stamina is poor.

If ATP levels drop as a result of leakage of AMP, the body has to make brand new ATP. ATP can be made very quickly from a sugar called D-ribose, but D-ribose is only slowly made from glucose (via the pentose phosphate shunt for those clever biochemists out there!). This takes anything from one to four days. So this delay is one possible explanation for the biological basis of delayed fatigue.

However, there is another problem. If the body is very short of ATP, it can make a very small amount of ATP directly from glucose by converting it into lactic acid. This is exactly what many CFS sufferers do and, indeed, we know that CFS sufferers readily switch into anaerobic (i.e. without oxygen) metabolism. However, this results in two serious problems – lactic acid quickly builds up especially in muscles to cause pain, heaviness, aching and soreness (“lactic acid burn”), secondly no glucose is available in order to make D-ribose! So new ATP cannot be easily made when you are really run down. Recovery takes days!

Worse than that, lactic acid has to be converted back to pyruvate in order to repeat the citric acid cycle – but this requires a lot of energy (ATP) and the ATP is not there. So lactic acid hangs about for a long time causing pain. Figure 2 illustrates these processes.

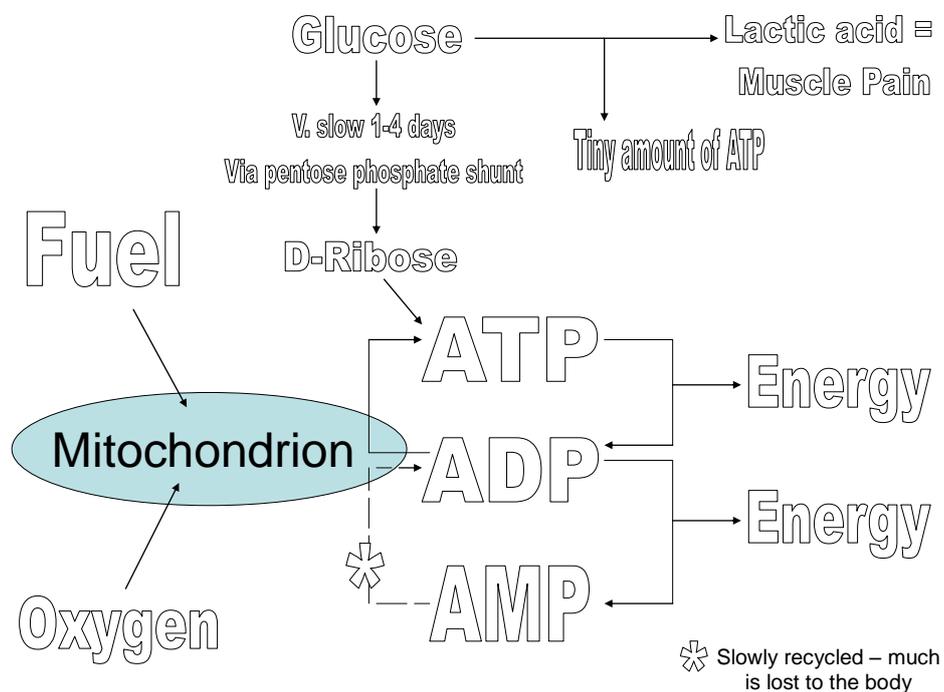


Figure 2

The biological basis of treatment is therefore explained:

1. **Pace** – do not use up energy faster than your mitos can supply it. Fatigue is the symptom that tells you how much to pace!

2. **Feed the mitochondria** - supply the raw material necessary for the mitochondria to heal themselves and work efficiently. This means feeding the mitos correctly so they can heal and repair.
3. **Address the underlying causes** as to why mitochondria have been damaged. This must also be put in place to prevent ongoing damage to mitos. In order of importance this involves:
 - Pacing activities to avoid undue stress to mitos
 - Getting excellent sleep so mitos can repair
 - Excellent nutrition with respect to:
 - taking a good range of micronutrient supplements
 - stabilising blood sugar levels
 - identifying allergies to foods
 - Detoxifying to unload heavy metals, pesticides, drugs, social poisons (such as alcohol, tobacco, etc.), volatile organic compounds and prescription drugs, many of which poison mitochondria either directly or through creating free radicals.
 - Optimising gut function – HYPOCHLORHYDRIA, PANCREATIC FUNCTION, GUT DYSBIOSIS
 - Addressing the common problem of hyperventilation
4. **Address the secondary damage** partly caused by mitochondrial failure such as immune disturbances resulting in allergies and autoimmunity, poor digestive function, hormone gland failure, slow liver detoxification.

And now for a bit of good news! You will have read (and will read again) that AMP cannot be recycled. Actually, AMP can be recycled, but it happens very slowly. For practical purposes for patients who are very fatigued, this recycling is so slow that it is clinically insignificant. Interestingly, the enzyme which facilitates this recycling ("cyclic AMP") is activated by caffeine! So the perfect pick-me-up for CFS sufferers could be a real black organic coffee with a teaspoon of D-ribose! Not too much or one can run into calcium problems. See STIFF MUSCLES.



Severe CFS is also low cardiac output secondary to mitochondrial malfunction

Three papers have come to my notice recently, which make great sense of both my clinical observations and also the idea that CFS is a symptom of mitochondrial failure. The two symptoms I am looking for in CFS to make the diagnosis is firstly very poor stamina and secondly delayed fatigue. I think I can now explain these in terms of what is going on inside cells and the effects on major organs of the body. More importantly, there are major implications for a test for CFS and of course management and recovery.

If mitochondria (the little batteries found inside every cell in the body) do not work properly, then the energy supply to every cell in the body will be impaired. This includes the heart. Many of the symptoms of CFS could be explained by low cardiac output because the heart muscle cannot work properly. Cardiologists and other doctors are used to dealing with low cardiac output due to poor blood supply to the heart itself. In CFS the low cardiac output is caused by poor muscle function and therefore strictly speaking is a cardiomyopathy. This means the function of the heart will be very abnormal, but traditional tests of heart failure, such as ECG, ECHOs, angiograms etc, will be normal.

The point is that the blood supply to the heart is fine (fuel and oxygen adequate) but the mitochondria cannot convert this to ATP, which is the currency of energy for muscle contraction.

Research by Dr Arnold Peckerman www.cfids-cab.org/cfs-inform/Coicfs/peckerman.etal.03.pdf shows that cardiac output in CFS patients is impaired. Furthermore the level of impairment correlates very closely to the level of disability in patients. Dr Peckerman was asked by the US National Institutes of Health to develop a test for CFS in order to help them to judge the level of disability in patients claiming Social Security benefits. Peckerman is a cardiologist and on the basis that CFS patients suffer low blood pressure, low blood volume and perfusion defects, he surmised CFS patients were in a low cardiac output state. To test this he came up with Q scores.

“Q” stands for cardiac output in litres per minute and this can be measured using a totally non-invasive method called Impedence Cardiography. This allows one to accurately measure cardiac output by measuring the electrical impedance across the chest wall. The greater the blood flow the less the impedance. This can be adjusted according to chest and body size to produce a reliable measurement (this is done using a standard algorithm). It is important to do this test when supine and again in the upright position. This is because cardiac output in healthy people will vary from 7 litres per min when lying down to 5 litres per min when standing. In healthy people this drop is not enough to affect function. But in CFS sufferers the drop may be from 5 litres lying down to 3.5 litres standing up. At this level the sufferer has a cardiac output which causes borderline organ failure.

This explains why CFS patients feel much better lying down. They have acceptable cardiac output lying down, but standing up they are in borderline heart and organ failure. CFS is therefore the symptom which prevents the patient developing complete heart failure. Actually, everyone feels more rested when they are sitting down with their feet up! The subconscious has worked out that the heart has to work less hard when you are sitting down with your feet up – so we do so because we feel more comfortable!

Low cardiac output explains the symptoms of CFS

The job of the heart is to maintain blood pressure. If the blood pressure falls, organs start to fail. If the heart is working inadequately as a pump then the only way blood pressure can be sustained is by

shutting down blood supply to organs. Organs are shut down in terms of priority, i.e. the skin first, then muscles, followed by liver, gut, brain and finally the heart, lung and kidney. As these organ systems shut down, this creates further problems for the body in terms of toxic overload, susceptibility to viruses which damage mitochondria further, thus exacerbating all the problems of the CFS sufferer.

Effects of low cardiac output on the skin

If you shut down the blood supply to the skin, this has two main effects. The first is that the skin is responsible for controlling the temperature of the body. This means that CFS patients become intolerant of heat. If the body gets too hot then it cannot lose heat through the skin (because it has no blood supply) and the core temperature increases. The only way the body can compensate for this is by switching off the thyroid gland (which is responsible for the level of metabolic activity in the body and hence heat generation) and so one could get a compensatory under active thyroid. This alone worsens the problems of fatigue.

The second problem is that if the micro-circulation in the skin is shut down, then the body cannot detox. This is a major route through which toxins, particularly heavy metals, pesticides and volatile organic compounds are excreted. Therefore the CFS sufferer's body is much better at accumulating toxins, which of course further damage mitochondria.

Symptoms in muscles

If the blood supply to muscles is impaired, then muscles quickly run out of oxygen when one starts to exercise. With no oxygen in the muscles the cells switch over to anaerobic metabolism, which produces lactic acid and it is this that makes muscles ache and fatigue so much.

As well as the above problem, muscles in the CFS patient have very poor stamina because the mitochondria which supply them with energy are malfunctioning. When mitochondria go slow, they produce more free radicals which further damage tissues through pro-oxidant stress.

When John McLaren-Howard does translocator protein function tests he often finds lactic acid stuck onto mitochondrial membranes – this illustrates one of the many vicious cycles in CFS – if TL protein is blocked by lactic acid, mitochondria work less efficiently and therefore one is more likely to switch into anaerobic metabolism and produce more lactic acid!

Symptoms in the liver and gut

Poor blood supply to the gut results in inefficient digestion, poor production of digestive juices and leaky gut syndrome. Leaky gut syndrome causes many other problems such as hypochlorhydria, allergies, autoimmunity, malabsorption, etc., which further compound the problems of CFS. See MALABSORPTION.

If liver circulation is inadequate, this will result in poor detoxification, not just of heavy metals, pesticides and volatile organic compounds, but also toxins produced as a result of fermentation in the gut again further poisoning the mitochondria. See DETOXIFICATION.

Effects on the brain

Last October I attended a conference sponsored by the late Dr John Richardson. A Canadian physician Dr Byron Hyde showed us some functional scans of the brains of CFS patients. If I had not known the diagnosis, I would have diagnosed strokes. This is because the blood supply to some area of the brain was so impaired. The default is temporary and with rest, blood supply recovers.

However, this explains the multiplicity of brain symptoms suffered from, such as poor short term memory, difficulty multi-tasking, slow mental processing and so on. Furthermore, brain cells are not particularly well stocked with mitochondria and therefore they run out of energy very quickly. Brain mitochondria are particularly dependent on blood sugar levels. Many brain symptoms are caused by HYPOGLYCAEMIA.

Effects on the heart

There are three effects on the heart. The first possible effect of poor energy supply is disturbance of the electrical conductivity which causes dysrhythmias. Many patients with chronic fatigue syndrome complain of palpitations, missed heart beats or whatever. This is particularly the case in patients with poisoning by chemicals since the chemicals are also directly toxic to nerve cells.

The second obvious result is weak heart beats. Over 50% of the weight of the heart is made up of mitochondria! . Symptomatically this causes chest pain and fatigue. In the longer term it can cause heart valve defects because the muscles which normally hold the mitral valve open also fatigue.

Thirdly as pressures drop in the heart, the foramen ovale gets blown open causing a right left shunt. Cheney estimates over 90% of CFSs have a PFO

THIS APPROACH TO TREATING HEART DISEASE IS EXACTLY THE SAME REGARDLESS OF THE CONVENTIONAL DIAGNOSIS. So patients with angina, high blood pressure, heart failure, cardiomyopathy, some valve defects as well as patients with cardiac dysrhythmias often also have mitochondrial problems and will respond in the same way to nutritional therapies and detox therapies.

Effects on lung and kidney

The lung and kidney are relatively protected against poor micro-circulation because they have the largest renin-angiotensin system, which keeps the blood pressure up in these vital organs. Therefore clinically one does not often see CFS patients with kidney failure or pulmonary hypoperfusion. However I increasingly find a low kidney glomerular filtration rate in CFS which may be symptomatic of poor mito function.

This effect is magnified further by a patent foramen ovale (PFO)

As a foetus, we all have a hole in the heart, which shunts blood from the right to the left side and largely bypasses the lungs. The blood passes from the right atrium to the left atrium via the foramen ovale (PFO), a hole in the heart with a flap so creating a valve – the blood can only go one way. This is ideal because as a foetus we get our oxygen from the placenta. At the moment of birth, the baby takes its first breath, this drops the pressure in the lungs and sucks blood from the right side of the heart - the pressures here drop and the flap over the foramen ovale snaps shut because the pressure on the left side is much higher than that on the right side. In 72% of the population this flap sticks down. But in the rest, it is the pressure difference between the left and the right side which keeps the valve stuck down. This is no problem when the heart beats strongly. Problems occur when the heart beats weakly, the pressure difference falls and minor pressure changes in the chest (such as valsalva) will open up the PFO creating a right/left shunt of blood. This means blood does not circulate round the lungs and oxygen levels fall! This will make energy levels fall precipitously for obvious reasons! See CHENEY AND PFO

Explanation of the fatigue problems in CFS patients.

Energy to the body is supplied by mitochondria, which firstly produce NAD (nicotinamide adenosine diphosphate) from Kreb's citric acid cycle and this is used to power oxidative phosphorylation, which generates ATP (adenosine triphosphate). These molecules are the "currency" of energy in the body. Almost all energy requiring processes in the body have to be "paid for" with NAD and ATP, but largely ATP. The reserves of ATP in cells are very small. At any one moment in heart muscle cells there is only enough ATP to last about ten contractions. Thus the mitochondria have to be extremely good at re-cycling ATP to keep the cell constantly supplied with energy.

If the cell is not very efficient at re-cycling ATP, then the cell runs out of energy very quickly and this causes the symptoms of weakness and poor stamina. The cell literally has to "hibernate" and wait until more ATP has been manufactured.

In producing energy, ATP (three phosphates) is converted into ADP (two phosphates) and ADP is re-cycled back through mitochondria to produce ATP. However, if the cell is pushed (ie stressed) when there is no ATP about, then it will start to use ADP instead. The body can create energy from ADP to AMP (one phosphate), but the trouble is that AMP cannot be re-cycled. The only way that ADP can be regenerated is by making from fresh ingredients, but this takes days to do. This explains the delayed fatigue seen in chronic fatigue syndrome.

So to summarise, the basic pathology in CFS is slow re-cycling of ATP to ADP and back to ATP again. If patients push themselves and make more energy demands, then ADP is converted to AMP, which cannot be recycled and it is this which is responsible for the delayed fatigue. This is because it takes the body several days to make fresh ATP from new ingredients. When patients overdo things and "hit a brick wall" this is because they have no ATP or ADP to function at all.



A vital test in chronic fatigue syndrome

The central problem of chronic fatigue syndrome is mitochondrial failure resulting in poor production of ATP. ATP is the currency of energy in the body and if the production of this is impaired then all cellular processes will go slow. It is not good enough to measure absolute levels of ATP in cells since this will simply reflect how well rested the sufferer is. The perfect test is to measure the rate at which ATP is recycled in cells and this test has now been developed by the brilliant medical biochemist Dr John McLaren-Howard. He calls it “ATP profiles”. It is a test of mitochondrial function.

Not only does this test measure the rate at which ATP is made, it also looks at where the problem lies. Part A measures levels of ATP in the cell. Release of energy from ATP is a magnesium dependent process and the first part of the test studies this aspect (I refer to this aspect of the test as Part A– this corresponds to the labels in Figure 3 below).

The second aspect of the test (Part B) measures the efficiency with which ATP is made from ADP in the mitochondrion. If this is abnormal then this could be as a result of magnesium deficiency, of low levels of Co-enzyme Q10, low levels of vitamin B3 (NAD) or of acetyl L-carnitine. It is also possible that ADP to ATP conversion is blocked and this is also seen on this part of the test.

The third possibility is that the protein which transports ATP and ADP across mitochondrial membranes is impaired and this is also measured (Part C).

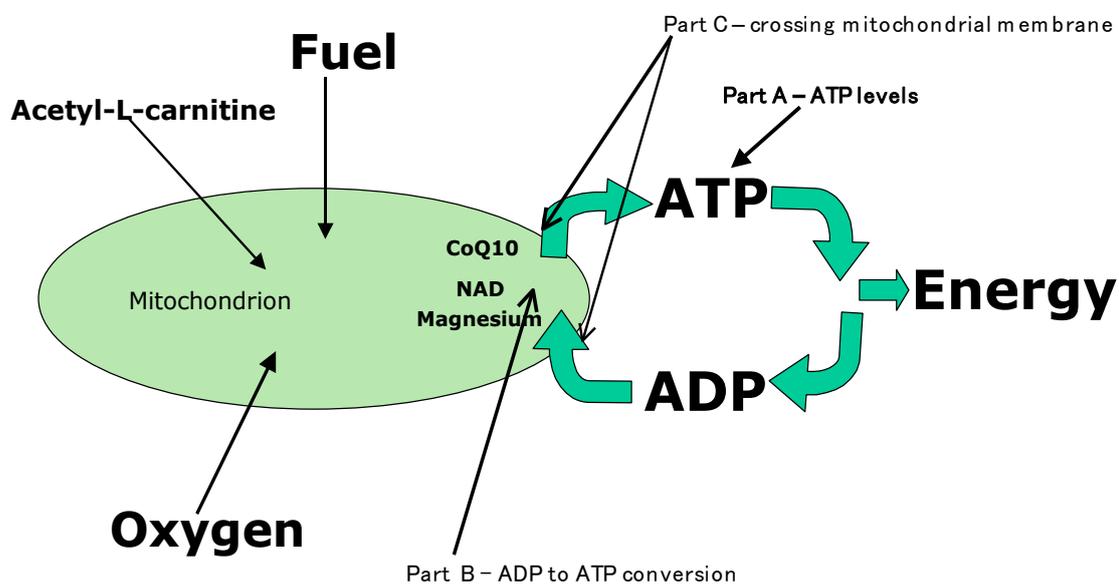


Figure 3

The joy of the ATP profiles test is that we now have an objective test of chronic fatigue syndrome which clearly shows this illness has a physical basis. This test clearly shows that cognitive behaviour therapy, graded exercise and anti-depressants are irrelevant in addressing the root cause of this illness.

To get the full picture I recommend combining this test with measuring levels of the front line antioxidants *Co-enzyme Q10*, *Superoxide dismutase (SODase)*, and *glutathione peroxidase* together with *NAD* (a functional test of vit B3 levels) and *L-carnitine*. See ANTIOXIDANTS.

Cell-free DNA is very useful because it measures tissue damage. When cells are damaged and die, they release their contents into the blood stream – cell-free DNA measures the extent of this damage. I believe this equates to how ill one feels – or malaise. The levels which come back are similar to those from patients recovering from major infections, trauma, surgery or chemotherapy – so this test puts CFS firmly in the realms of major organic pathology. Where there is tissue damage, the immune system is activated for healing and repair – this requires energy and can produce distressing symptoms such as PAIN and INFLAMMATION.

SODase is an important antioxidant which mops up the free radicals produced in all the inefficient chemical reactions in the cells. Dr McLaren-Howard also looks at the genes which code for the different types of SODase! It is common to find blockage or polymorphisms typical of toxic stress. See INFLAMMATION.

Dr McLaren-Howard has recently developed a serum L-carnitine test and made it available in September 2009. I have now included it in the Mitochondrial Function Profile.

In fact, all of these above blood tests have now been combined as a *Mitochondrial function profile* and can be ordered from my practice – see details below p. To order any test 133.

One other important co-factor in the production of energy in cells is D-ribose. It is used up so quickly by cells that measuring levels is unhelpful, but low levels of ATP imply low levels of D-ribose. .

Therefore, the cost of the *Mitochondrial function profile*, which will now include the mitochondrial function studies (ATP profiles), levels of Co-enzyme Q10, glutathione peroxidase, zinc copper SODase, manganese SODase and extracellular SODase together with NAD levels, cell-free DNA and L-carnitine is £225, plus £70 for the letter of interpretation to the GP.

John McLaren-Howard now has specialist equipment to refine these tests further, particularly in respect of oxidative phosphorylation. See Practical Details p. 133 should you wish to order this test

Implications for Treatment

Many patients I see get well with my standard work up with respect to **vitamins and minerals, diet, pacing and sleep**, i.e. **the foundations of recovery**. All these things must be put in place to repair and prevent ongoing damage to mitochondria so allowing them to recover. For mitochondria to recover they need all the essential vitamins, minerals, essential fatty acids and amino acids to manufacture the cellular machinery to restore normal function. The mitochondrial function tests then allow us to identify lesions which can be corrected by attention to nutritional supplements, improving antioxidant status, detoxing, hyperventilation or whatever. CFS sufferers have limited reserves of physical, mental and emotional energy and this test allows us to direct those energies into the most fruitful line of approach. (see p. 24 for the interpretation of the mitochondrial function test results)

Examples of some test results

ATP profiles

This patient has low levels of ATP (1), low magnesium (2), poor conversion of ADP to ATP (3) with blockage of the active sites (4) together with poor translocator protein function (5) – no wonder there is severe fatigue!

Acumen

PO Box 129, Tiverton, Devon EX16 0AJ

Telephone/voicemail: 077 0787 7175

E-mail: acumenlab@hotmail.co.uk

Acumen: 180067 Patient: Mirhane McLaren
 Date of birth: 01/01/1964
 Reported: 06/11/2003 Doctor: Dr Sarah Myhill

ATP (adenosine triphosphate), studies on neutrophils

ATP is hydrolysed to ADP and phosphate as the major energy source in muscle and other tissues. It is regenerated by oxidative phosphorylation of ADP in the mitochondria. When aerobic metabolism provides insufficient energy, extra ATP is generated during the anaerobic breakdown of glucose to lactic acid. ATP reactions require magnesium. ADP to ATP conversion can be blocked by environmental contaminants as can the translocator [TL] in the mitochondrial membrane. [TL] efficiency is also sensitive to pH and other metabolic-factor changes. [TL] defects may demand excessive ADP to AMP conversion (not re-converted to ADP or through to ATP). Defects in Mg-ATP, ADP – ATP conversion and enzyme or [TL] blocking can all result in **chronic fatigue – a factor in any disease where biochemical energy availability is reduced.**

ATP whole cells:

With excess Mg added (Standard method of measuring ATP)	1.43	nmol/10 ⁶ cells	1.6 – 2.9
Endogenous Mg only (Measured ATP result is lowered during intracellular magnesium deficiency)	0.82	nmol/10 ⁶ cells	0.9 – 2.7
Ratio ATP/ATP ^{Mg}	0.57	> 0.65

ADP to ATP conversion efficiency (whole cells):

ATP ^{Mg} (from above)	1.43	nmol/10 ⁶ cells (1*)	1.6 – 2.9
ATP ^{Mg} (inhibitor present)	0.55	nmol/10 ⁶ cells (2*)	< 0.3
ATP ^{Mg} (inhibitor removed)	1.02	nmol/10 ⁶ cells (3*)	≥ 1.4
ADP to ATP efficiency [(3* - 2*) / (1* - 2*)] x 100 =	54.7	%	> 60

Blocking of active sites (2*/1*) x 100 = **38.5** % up to 14

ADP-ATP TRANSLOCATOR [TL] (mitochondria, not whole cells):

	ATP (pmol/10 ⁶ cells)	Ref. range	change %	ref. range
Start	274	290 – 700		
[TL] 'out'	358	410 – 950	30.7	over 35% (Increase) (in-vitro test) reflects ATP supply for cytoplasm
[TL] 'in'	198	140 – 330	27.7	55 to 75% (Decrease) (in-vitro test) reflects normal use of ATP on energy demand

Comments

Low whole-cell ATP. Poor ATP-related magnesium availability.
 38% blocking of active sites leading to: Poor ADP-ATP re-conversion.
 Low mt-ATP and poor provision of 'new' mt-ATP. Restricted access to mt-ATP secondary to the 38% blocking of translocator sites.

Dr John McLaren-Howard

Mrs Mirhane McLaren-Howard

For and on behalf of Acumen

A closer look at oxidative phosphorylation with micro-respirometry studies

Acumen

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E-mail: acumenlab@hotmail.co.uk

Reference:

Patient:

Date:

Doctor:

MicroRespirometry: Studies of Mitochondria

Background and methodology: Venous white cells are separated on a Histopaque™ gradient and the mitochondria from a standardised number of cells are extracted using molecular sieve material doped with atractyloside. 50ul of washed mitochondrial suspension in a phosphate-medium of known oxygen saturation is placed in the thermostatically controlled, magnetically stirred Strathkelvin Mitocell with software monitoring of oxygen use. A mix of substrates is injected into the chamber and, normally, very little oxygen consumption occurs. The phosphorylation (production of ATP) is **coupled** to requirements. High O₂ consumption at this stage would indicate the presence of a chemical that is **uncoupling** electron transport and oxidative phosphorylation*. With stable conditions established, ADP is added. This condition reflects energy use and the ADP level **should** dictate how much oxygen is used in re-converting the ADP to ATP. Inability to achieve the expected O₂ use and/or a change in the rate of reaction reflects substrate insufficiency (we vary the levels to see what is missing) or the presence of a chemical inhibitor*.

*Further investigation may be needed to establish the nature of any uncoupling agent or inhibitor. Examples: translocator [TL] studies, DNA adducts, screens for toxic substances or the investigation of detoxification mechanisms.

Patient's results superimposed on mean control data (n=48)

— Control mean. Control range.

- A. pH 7.25, PO₄ 100mM
198uM O₂/l (at 37°C).
- B. CoQ10, B3, Mg, Ribose
(normal substrate needs).
- C. ADP (1.5nM/10⁶ cells)
(mimics normal energy use)
- D. ADP fully utilised.
(normal response).
- E. End of monitoring -
around 15% of starting O₂ and
about 14 minutes monitoring.

Patient's results

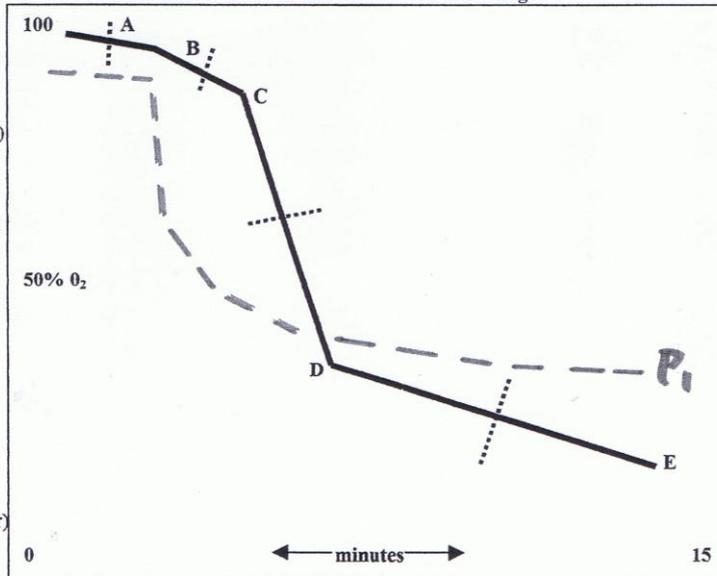
P₁ Additions as B & C above

Substrate changes when indicated by P₁ results:

- P₂ 2mM Mg added
- P₃ 2mM CoQ10 added
- P₄ 1mM B3 added
- P₅ 1mM D-ribose added

Inhibition or uncoupling:

- I 1mmol/l rotenone (inhibitor)
- U 1mmol/l DNP (uncoupler)
(DNP = dinitrophenol)



Note: Clinical application of these research procedures is at the discretion of the requesting doctor.

Comments:

P₁ Rapid O₂ use before the addition of ADP showing that electron transport is (at least partly) uncoupled. BUT O₂ use almost ceases at 45% O₂ availability this is not improved by extra additions as in P₂-P₅? In spite of the uncoupling,

Dr John McLaren Howard

Mrs Mirhane McLaren Howard

John and Mirhane McLaren Howard trading as ACUMEN

oxidative phosphorylation is partly inhibited and it does not seem to be a substrate deficiency. *FIN*

A closer look at translocator protein studies

Acumen

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E-mail: acumenlab@hotmail.co.uk

Reference:

Patient:

Date:

Doctor:

Mitochondrial membrane TL protein studies [TL]

[TL] scavenges ADP from cytoplasm and returns ATP from re-conversion plus 'new' ATP from oxidative phosphorylation. [TL] can be blocked by xenobiotics and/or partial detoxification products. The site is also pH sensitive and can be affected by local or general acidosis including organic acid accumulation from anaerobic metabolism. [TL] efficiency is also compromised by increases in intracellular calcium. **The test sequence** examines the white cell mitochondria using phase-contrast, dark field and polarising microscopy. We search for [TL] adducts using a micro-plate array of fluorescence probes. Positive indications are explored at the molecular level. Detailed fluorescence microscopy at extreme magnifications employs de-convolution and Helicon FocusPro™ software. **A detailed [TL] technical information sheet is available on request.**

Initial examination:	(L-Normal-H)	Micro electrode:			
Number of mitochondria	N	Outer membrane pH	< 6.8 (low)	6.8 - 7.4	> 7.4 (high)
Mitochondrial clumping	N	Patient's result:		6.9	
Mt membrane structure	N	Outer membrane Ca ²⁺	< 200 norm	200 - 300	> 300 umol/l
Mt-DNA fluorescence	N	Patient's result:			410 #1
Mt membrane binding:-	Proteins	Esterases	Lipids	Diolein	Aldehydes
L (low), N (norm), H (high)	N	N	N	TRACE	H #2

(ND = not detected) (# = see additional comments)

Other substances found on [TL] sites:

	Trace	High		Trace	High
Glutathione conjugates	✓		Dichlorobenzene		
Sulphate conjugates			Organophosphate**		
Peptide complexes*			Toxic metal(s)***		
Unusual proteins*			Foreign DNA/RNA		
L = Lactate, K = Keto acids			Immune complexes		
Chlorinated pesticide**			Nitrosamines	✓	✓ #4
Pentachlorophenol			Diamino compounds		
Other chlorinated phenol**			Diazo compounds		
Poly chlorinated byphenyls			Others: DIOLEIN OR A-RELATED, TOXIC, FATTY ACID		✓ #3
Poly brominated byphenyls					
#2 MALONDIACETALDEHYDE & CROTONALDEHYDE ✓					
* Protein precipitation?					(peptides cannot be pptd)
** Identity if known					
*** Metal(s) found					(atomic emission analysis)

Essential elements associated with mt-membranes:

Potassium			Magnesium			Zinc		
Low	Normal	High	Low	Normal	High	Low	Normal	High

Additional comments:

- #1 High intracellular calcium.
- #2 Complex aldehydes - from lipid peroxidation, on membranes generally and also on some TL sites.
- #3 DIOLEIN in membrane lipids on on some TL sites.

Dr John McLaren Howard

Mrs Mirhane McLaren Howard

John and Mirhane McLaren Howard trading as ACUMEN

- #4 Traces of nitrosamines - from burnt organic matter (including smoking?). JMAH

Cardiolipin Studies – a closer look at mitochondrial membranes

Acumen

PO Box 129, Tiverton, Devon EX16 0AJ

Telephone/voicemail: 077 0787 7175

Reference:

Patient:

Date:

Doctor: Dr Sarah Myhill

Cardiolipin studies in mitochondrial membranes

Fluorescence microscopy methods have been used for the following tests on white blood cell mitochondria. A detailed study titled "Malondialdehyde, [TL]-sites and Cardiolipin" is available from Acumen on request.

Cardiolipin (CL):	Patient	Controls (n = 84)
Percentage of membrane lipids that fluorescence-stain as CL	22	19 to 28%
CDP-diacylglycerol pmol/10 ⁶ mt (CL-synthesis precursor)	194	105 to 230 pmol
CL-Synthase (units/10 ⁶ mt)	72 *1	85 to 130 units
CL-Synthase manganese sites No. per 10nM of mt membrane	18	11 to 24
No. of above occupied by metals other than manganese	10 *2 (metal if identified: SEE BELOW)	Up to 3
CL-binding xenobiotics (identified if possible)*	(NICKEL) *3	Not present
Cytochrome-c oxidase molecules (No. bound to each CL molecule)	2	2
Gating action of cytochrome-c-CL complex (on pH change)	Decrease - (Normal) - Increase	Normal
Oxidative stress on cytochrome-c CL complex	(Normal) - Increase	Normal
Malondialdehyde (MDA)		
Concentration pmol/10 ⁶ mt	30	Up to 32
Phosphatidylethanolamine and phosphatidyl choline	The major phospholipids in membranes with cardiolipin in the mitochondria only.	
Semi-quantitative assessment:	PTE: Low - (Normal) - High	Normal
	PTC: Low - (Normal) - High	Normal

Additional comments (*including xenobiotics if identified):

- *1 Poor CL-synthase activity but CL% and precursor concentrations are normal.
- *2 56% (10/18) Mn^{CL}-synthase sites carry NICKEL or CALCIUM rather than manganese. This is the reason for poor CL-synthase activity.
- *3 Some nickel complex is also bound to CL other than at the CL-synthase (mn) sites.

Dr John McLaren Howard

Mrs Mirhane McLaren Howard

John and Mirhane McLaren Howard trading as ACUMEN



RECEIVED

10 MAR 2008

Anti-oxidant studies

Acumen

PO Box 129, Tiverton, Devon EX16 0AJ

Telephone/voicemail: 077 0787 7175

E-mail: acumenlab@hotmail.co.uk

Acumen: _____

Patient: _____

Date of birth: 10/04/1974

Reported: _____

Doctor: _____

SUPEROXIDE DISMUTASE and GLUTATHIONE PEROXIDASE

A functional test looks at the in-vitro efficiency of the patient's red cell superoxide dismutase (SOD) when their neutrophil superoxide production is maximally stimulated. The activity of the individual forms of SOD are explored. General cell protection from damage by superoxide is provided by intracellular zinc:copper-SOD (Zn/Cu-SOD). Mitochondria are protected by manganese-dependent SOD (Mn-SOD). Extracellular SOD (EC-SOD – another Zn/Cu SODase) protects the nitric oxide pathways that relax vascular smooth muscle.

For each form of SODase, genetic variations are known, mutations can occur during excessive oxidative stress on DNA and polymorphisms may be present. DNA adducts can chemically block these genes.

Glutathione peroxidase (GSH-PX) activity is measured in red blood cells. It is a selenium-dependent enzyme and selenium deficiency is the commonest cause of poor enzyme activity. As poor glutathione (GSH) availability is easily overlooked as an additional reason for poor GSH-PX activity, we also measure total GSH in red cells.

Blood test results:

Test	Result	Units	Reference range
Functional test	34	%	Over 40 (mostly 41 – 47)
Zn/Cu-SOD	178	Enzyme activity (u)	240 – 410
Mn-SOD	242	Enzyme activity (u)	125 – 208
EC-SOD	21	Enzyme activity (u)	28 – 70

Very poor level

Gene studies:

Sod form	Gene(s)	Comments
Zn/Cu-SOD chromosome 21	? Partly blocked	Low enzyme activity
Mn-SOD chromosome 6	Possibly polymorphic	High activity-? Polymorphism
EC-SOD chromosome 4	Normal	Low enzyme activity

Low normal level

Glutathione peroxidase (GSH-PX)

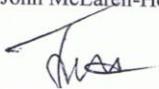
Red cell	Glutathione peroxidase (GSH-PX)	67	U/gHb	67 – 90
Red cell	Glutathione (GSH)	1.52	mmol/l	1.7 – 2.6

Very poor level

Dr John McLaren-Howard

Mrs Mirhane McLaren-Howard

For and on behalf of Acumen



PART III: TREAT THE MITOCHONDRIAL METABOLIC DYSLEXIA



Interpretation of ATP Profiles test and implications for treatment

The ATP profiles test is a measure of mitochondrial function. The only job of mitochondria is to provide energy for cell metabolism in the form of ATP. Whilst all cells of the body are different, mitochondria are the same and so this test has huge implications not just for CFS but also for the pathophysiology of many degenerative diseases such as heart disease, Alzheimer's, Parkinson's and many others. Indeed, it is the rate at which mitochondria slow down and degenerate that determines the natural ageing process. There is now good evidence that the basic pathophysiological defect in chronic fatigue syndrome is slow recycling of ATP and this elegantly explains the symptoms of CFS. "ATP profiles" test can therefore be used to make the diagnosis of CFS, to assess the level of disability objectively, to identify where the biochemical lesion lies and give pointers as to how to further elucidate and correct that biochemical lesion.

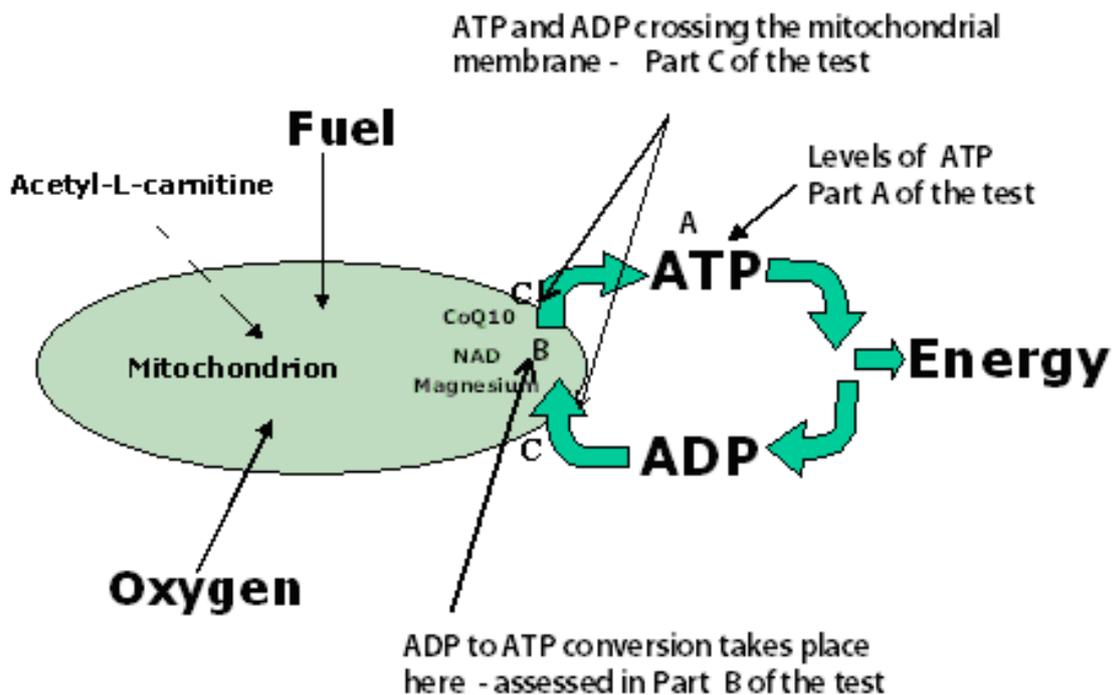
Indeed, there is now good evidence that mitochondria are responsible for the normal ageing process. This means I can tell my CFS patients that once they recovered, if they hold all the regimes in place, they can substantially reduce their risk of cancer, arterial disease, diabetes, neurological disease and other degenerative disorders and greatly increase longevity – "Your best years are ahead of you!"

As we age we acquire what I want to call "metabolic dyslexias" – we become less good at making certain key molecules. Co-enzyme Q 10 and D-ribose are likely to be amongst them because both require complicated biochemistry.

The biochemical lesion may result from a nutritional deficiency, from a stress (which may be endogenous, free radical stress, or exogenous toxic stress) or from a metabolic dyslexia – i.e. some enzyme block which inhibits the production of essential nutrients. The best documented is enzyme blockage by statins, which inhibit the endogenous production of co-enzyme Q 10, the most important acceptor and donor of electrons in the Krebs's citric acid cycle (oxidative phosphorylation).

Not only do statins almost invariably worsen fatigue syndromes but probably also accelerate the normal ageing process.

The ATP profiles test looks at levels of ATP (A), rate of oxidative phosphorylation (B) and translocator protein function (C). The letters A, B and C in the diagram below indicate the sites in the cell where the various biochemical processes take place and correspond to the three parts of the ATP profiles test. For a sample test result see (or click on) p. 19



Part A - Levels of ATP and ATP to ADP conversion

The first thing to look at in the result is the absolute level of ATP. If this is low, then this suggests two things. Firstly, poor ability to make de novo ATP from its raw material, D-ribose. D-ribose in an individual with normal metabolism can be made from glucose via the pentose phosphate shunt. However, if this is malfunctioning, D-ribose is made slowly. Indeed, this probably explains the delayed fatigue in CFS. The treatment is to supplement with D-ribose starting with three teaspoonfuls daily (15gms) and adjusting according to response. Sufferers may see changes within a few days. Clinically I expect to see less delayed fatigue and improvement in muscle pain and aching. D-ribose has a very short half-life and should be taken in small doses throughout the day in drinks (hot or cold). Interestingly caffeine may enhance the effects of D-ribose so I recommend taking with green tea, coffee, tea or whatever so long as these are tolerated. It is worth supplementing D-ribose even with low normal results because I have so much happy feedback from patients taking this supplement.

Some people do not tolerate D-ribose. This may be because D-ribose is derived from corn and small amounts of corn antigen remain to which one may react allergically. Some people with a candida

problem (see YEAST and CANDIDA) may convert D-ribose back to glucose so it is fermented by yeast thereby worsening the yeast problem.

Secondly, low levels of ATP may mean that the sufferer is not pacing properly. When one overdoes things, ADP is created faster than ATP can be made. This results in a build up of ADP and some is inevitably shunted into AMP (the monophosphate) which cannot be recycled. Thus the cell has to make de novo ATP from D-ribose.

Release of energy from ATP

Next look to see the rate at which ATP is converted to ADP. This is a magnesium dependent process; therefore if the rate of conversion is slow, it results from magnesium deficiency. I have been interested in fatigue syndromes since 1982 and have found magnesium deficiency to be the knottiest problem I have come across! I now know why. Low intracellular magnesium is a symptom of CFS and a cause of it. This is because 40% of resting energy simply fires sodium/potassium (Na/K) and calcium/magnesium (Ca/Mg) membrane ion pumps. So when energy supply is diminished, there is insufficient energy to fire these pumps, so magnesium cannot be drawn into cells for oxidative phosphorylation to work, so there is a further diminishing of energy supply. This is just one of the many similar vicious cycles in CFS.

Sufferers do not simply replete through taking magnesium supplements – although this must be tried! Some need magnesium by injection to get the desired result. I usually start with 2mls of 50% Evans magnesium sulphate weekly and adjust the dose according to clinical response. But now I find it much less painful to self-inject smaller amounts (say 1/2ml) every day using a fine insulin syringe with a little bit of lignocaine. Also warm the injection to blood heat – this makes it much less painful.

Part B - Oxidative phosphorylation – the recycling of ATP from ADP

This part of the test looks at the rate at which ADP is converted back to ATP. The whole process is done by Krebs citric acid cycle (KCA) (dig out those old “O level” biochemistry books at once!) followed by oxidative phosphorylation. There is lots of potential for things to go wrong here! The bits we know about (and there will be others!) which may make oxidative phosphorylation go slow include:

Vitamin B3 is vital as the raw material to make NAD – most people replete levels on 500mgs of niacinamide, but some people seem to need 3,000mgs daily to get a result. At levels above 500mgs, liver function tests need checking every month for three months, then every 6 months. Low B3 may also be a symptom of poor function of Krebs’ citric acid cycle. This is because NAD is a functional test and it does not just reflect B3 status. The job of KCA is to take energy from acetyl groups and convert it into NADH, which is then of course converted to NAD in the process of driving oxidative phosphorylation. Therefore, to see normal levels of NAD needs not only an adequate supply of B3, but also a functioning Krebs’ citric acid cycle.

Magnesium deficiency – Mg catalyses many reactions in KCA cycle. Mg may have to be given by injection to replete levels.

Acetyl L carnitine - to get fuel for oxidative phosphorylation to burn, it needs to be transported as the acetate across the mitochondrial membrane by acetyl L carnitine. This is normally present in mutton, lamb, beef and pork but generally in not enough amounts to replete the deficiencies in fatigued states. As a routine I recommend taking acetyl L carnitine 1-2 grams daily.

John McLaren-Howard also looks to see if there are any chemical blockages in this process which could point to toxic stress (heavy metals, pesticides, volatile organic compounds etc). Often this is found together with blockage of translocator protein because the same toxin is involved.

However, clinical experience, which I have nicked from the American Cardiologist Dr Stephen Sinatra, is that co-enzyme Q 10 is vitally important as the main shunter of electrons in oxidative phosphorylation. Co-Q 10 is an important antioxidant which prevents free radical damage. Furthermore, poor antioxidant status slows oxidative phosphorylation so I routinely recommend B12 injections when ADP to ATP conversion is slow. B12 is a good scavenger of a major free radical peroxynitrite and effectively gives instant anti-oxidant cover. Again, B12 can be given by sub-cutaneous 1/2ml injections which are well tolerated.

It is possible to see a normal rate of oxidative phosphorylation in someone who is pacing well. However, if that sufferer should push themselves, abnormalities would appear. So just because oxidative phosphorylation is OK does not mean you can give up pacing! We can look at oxidative phosphorylation in more detail by doing microrespiratory studies.

Part C - Movement of ATP and ADP across mitochondrial membranes

This is dependent on translocator protein which sits in the mitochondrial membrane and shunts ATP and ADP to and fro. Indeed 80% of mitochondrial membranes are made up of TL protein! If this is malfunctioning then it suggests blockage by some sort of toxin. As yet we are not sure which are the most likely toxins involved but this will become apparent with time and experience. Many toxins can do this, they could be endogenous toxins (from free radicals) and they could be exogenous from heavy metals, pesticides, VOCs or whatever. However, these exogenous toxins can all be got rid of by sweating regimes. Exercise is obviously the most physiological method but impossible for CFS sufferers! I would recommend a sweating detox at least three times a week and my preferred technique is with far infra-red saunaing. (See FAR INFRARED SAUNA information).

TL protein function is an area where more research is being done, but another possible reason for TL protein blockage is intracellular acidosis. This can occur with hyperventilation, which, I suspect, is much more common in CFS than realised. Hyperventilation causes a respiratory extracellular alkalosis, and intracellular acidosis – these changes can occur within a few abnormal breaths (see HYPERVENTILATION information).

We now have a new test of translocator protein function which can explore in detail the precise reasons why there is blockage. Clinically I have found this a very useful test.

Secondary damage and antioxidant status

If you burn fuel to produce energy, you make smoke. One cannot create energy without smoke damage in the form of free radicals. Co-Q 10 is a vital scavenger of electrons which prevents secondary free radical damage. So it is well worth measuring Co-Q10 levels and clinical experience is that levels should ideally be above 2.5 umol/l.

However, if oxidative phosphorylation goes really slow, this may be because of poor antioxidant status resulting in excessive levels of free radicals, in particular superoxides and nitric oxide. These

two free radicals stick together to make peroxynitrite, which is even more toxic. These quickly use up available antioxidants. So if ATP production is slow, it is worth also measuring superoxide dismutase (*SODase*) and, if necessary, taking mineral supplements to correct deficiencies and ensure the ability to mop up superoxides, having B12 by injection (which mops up nitric oxide and peroxynitrite), measuring glutathione peroxidase and again, if necessary, taking glutathione and selenium and possibly taking vitamin C to bowel tolerance, and vitamins E and A. There are many natural antioxidants in nuts, seeds and vegetables, hence the benefits of a wholefood diet, juicing.

Antioxidants to consider are:

- Superoxide dismutase
- Glutathione peroxidase – this requires selenium 200mcgms daily and amino acids for its synthesis (high protein diet).
- Co-enzyme Q 10 - is the most important antioxidant inside mitochondria (see above)
- B12 – this is an excellent scavenger of the free radical peroxynitrite and may take over some of the function of SODase if this is very deficient – it provides instant antioxidant cover
- Other antioxidants also important as mentioned above – acetyl L carnitine, NAD (especially in the brain). Also vitamins A, C and E are essential antioxidants. Natural antioxidants are also present in vegetables, nuts and seeds.

See ANTIOXIDANTS for more information.

Tertiary damage – Cell-free DNA

If free radicals persist, they damage the cell. This may initially just be enzyme damage which makes the cell go slow (and worsens all the above problems) or actual structural damage even resulting in cell death. When the cell dies, it releases its contents into the blood stream. John McLaren-Howard can test for this by measuring cell-free DNA in the blood. Cell-free DNA is a measure of tissue damage. When tissues are damaged, cells rupture and release their contents into the blood stream as fragments. These fragments include DNA, so when this is found not contained within a cell membrane, it is as a result of tissue damage. Cell-free DNA is raised in, for example, tissue damage due to sepsis, trauma, cancer, radiotherapy, chemotherapy and other such pathologies. It is also raised in CFS and accurately reflects the degree of fatigue. A high cell-free DNA therefore tells us something is going very wrong, such as:

- There is poor antioxidant status (see Co Q 10, SODase, GSH-PX),
- There is ongoing toxic stress (such as from pesticides, volatile organic compounds, heavy metals etc),
- There is immune activation (as for example in acute infection),
- There is very poor mitochondrial function (see mitochondrial function) score but the patient is forced to do some muscular activity just in order to live.
- The patient is not pacing well – i.e. pushing too hard and this is resulting in cell damage. However some people who are very disabled have no choice – just the energy required to exist will cause tissue damage. So people with the worst mitochondrial function score often have high cell free DNAs even though they are doing almost nothing.

All these issues need addressing!

The cell-free DNA test puts chronic fatigue syndrome firmly in the camp of serious organic disorders.

There are several problems with high levels of cell damage:

- It takes time for new cells to be made and this may partly also explain the delayed fatigue in CFS.
- The immune system may react against these bits of cell floating about thereby switching on allergies. In trying to deal with these bits, the immune system damages even more cells if their superoxide dismutase is low. This becomes a serious vicious cycle.
- The immune system may react against these bits of cell floating about thereby switching on autoimmunity.

THESE ARE DISEASE AMPLIFYING EFFECTS! You make yourself worse if you don't pace. Exercise regimes are positively dangerous! Fatigue is the symptom that protects the body from itself!

The Mitochondrial Function Score

I am now able to score the mitochondrial function tests in order to give an energy score. I have now done well over 500 of these tests since 2005, and the mitochondrial energy score accords closely with the level of disability. This score takes into account the levels of ATP, how well it releases energy (a magnesium dependent process), how efficiently oxidative phosphorylation works as well as translocator protein function. This gives me an objective measure of the level of fatigue – that is to say, I can tell you how fatigued you are! In the paper "Chronic Fatigue Syndrome and Mitochondrial Dysfunction" published in January 2009 and available by a link from the News page on my website www.drmyhill.co.uk you will find my graph of the mitochondrial function scores against the level of disability. There is a very close correlation. It also tells you how I calculate this score.

If the score does not fit clinically, then this may well be because of tissue damage. Many CFS sufferers push themselves to do things at the expense of damaging their tissues. So they can choose between feeling better and doing very little, or having a life and feeling terrible. Most do the latter. So the mitochondrial function score is a measure of how much energy they have got to spend and the cell-free DNA a measure of how well they feel.

In CFS there is a balancing act between energy levels and cell damage – most people get this wrong, overdo things and end up with tissue damage, which is a disease amplifying effect. Pain and fatigue are the symptoms which protect the body from over-doing things!



Correcting the biochemical blocks is just one part of recovery

A running team can only go as fast as the slowest runner. The same is true in biochemistry. If one corrects one aspect of what is going wrong, one may not see improvements because suddenly another rate limiting step becomes apparent and the sufferer is slowed for another reason. So it is vital to keep the regime tight and in place as long as possible. For example, it is no good getting the biochemistry perfect if you aren't sleeping! That alone would cause fatigue. So as well as putting in place all the nutritional supplements, it is vital to continue with PACING, DIET and SLEEP.

TO SUMMARISE AT THIS STAGE

Because the nutritional regimes seem complicated, it is helpful to understand why the different nutrients are important the overall treatment plan. It is simply like getting a car engine to work. It is no good just filling the tank with fuel, or just unblocking the fuel pipe, or doing any one of the necessary jobs such as cleaning the spark plugs, unblocking the air filter, filling the engine with oil, unblocking the exhaust pipe etc on its own – one has to do all these bits in order to make it run. I have to say I have had such happy feedback from patients able to complete the regime that it is really well worth working hard at. The above recommendations have to be done in conjunction with my basic work up for all CFS sufferers with respect to:

- PACING (see p. 31),
- MICRONUTRIENTS – multivitamins, multiminerals, EFAs, vit C and D (see p. 46),
- SLEEP – aim for 9 hours between 9.30pm and 6.30am (see p. 50)
- DIET (low GI diet which avoids the major allergens - see p. 56) and PROBIOTICS (see p. 66

Once these “cornerstones” of recovery are in place, one should then introduce the other elements of the overall regime in order of priority i.e.

- Correcting mitochondrial function - D-ribose, Mg injections, NAD 500mgs, acetyl L carnitine, meat, Co Q 10.
- Addressing poor antioxidant status - B12, Co Q 10, SODase, glutathione peroxidase
- Detox regimes where appropriate - i.e. sweating techniques
- Correcting secondary hormonal lesions, in particular secondary hypothyroidism, secondary hypoadrenalism and poor melatonin levels.
- Identifying chronic infections – although once the biochemistry is corrected then the immune system gets rid of infection without anti-microbials.

I know I am asking for much to be done and it maybe there is insufficient energy to put in place all the interventions required at once. Furthermore some of my very tender flowers do not tolerate all the interventions at once and so one has to progress slowly. I like to see patients get the regime in place and get the regime as tight as possible with respect to all the problems identified. Then I like them to be feeling well at rest. Then, and only then may they risk trying to do a little more, but this must be on the proviso that any loss of stamina or delayed fatigue and they must pull back again. What often gets in the way is allergy – it is deeply frustrating when the sufferer does not tolerate the very supplements they need for recovery.

The Energy Balance in CFS

John McLaren-Howard points out that it is vitally important for treatment to recognise that all patients with CFS are in some sort of energy equilibrium, which is a very delicate one. Indeed, it is quite shocking from the results seen so far how critical that situation is. It is a marvel of human metabolism and the human spirit that patients with these very severe results manage to exist at all! For example, the cell-free DNA results give similar results to patients on cancer chemotherapy – and everyone knows how ghastly they feel and how little they can do!

Pacing

One final word about PACING, and this also applies to people who do not suffer from CFS. If you push your mitochondria too much, you will cause a disproportionate amount of damage because of the secondary and tertiary effects – just because you feel better, do not be tempted to do too much – or you will simply create damage elsewhere and postpone your recovery further! If my horse has worked hard during a long day hunting, she has complete rest in the field with lots of good food for four days before being ridden again. That way she stays fit and healthy! So the key is:

The road to recovery is:

GET THE REGIME TIGHT, then

FEEL WELL AT REST. You must feel well at rest for some weeks before you dare try increasing your level of activity. If you do too much too soon, you will simply trigger a biochemical and clinical collapse. Then

GRADUALLY INCREASE ACTIVITY SO LONG AS THERE IS NO DELAYED FATIGUE.

Once you get to a level of normal activity and feel well, then you can start to relax the regime!

In practice nobody does it this way because life has a nasty habit of getting in the way! But this is the shape of recovery that should be borne in mind at all times.

Actually this package of treatment is a blueprint for normal good health! Once this lot is in place, you will be highly protected from Western degenerative diseases such as heart disease, cancer and neurological nasties.

Further Implications for Treatment - details

If the body is functioning normally and has access to all essential minerals, vitamins, essential fatty acids and amino acids, it can make all these essential ingredients, in particular co-enzyme Q 10, acetyl L-carnitine and D-ribose. Magnesium must be supplied from the diet or supplements. This explains why most patients get well on my standard work up of treatment because this supplies all the essential ingredients for the body to heal itself.

However, for those who do not get well, it is likely that there is some sort of metabolic defect which prevents them from manufacturing these essential ingredients. I call this metabolic dyslexia! It may well be that genetically poor mitochondrial function alone is the problem, or there may be toxins or pesticides stuck in the system which stop the mitochondria functioning properly. It may well be that once the patient has dropped below a certain critical level, all cellular processes are going so slow that the sufferer is unable to manufacture the very things required to restore health. With age, our metabolism becomes less efficient anyway and we may need more raw materials in order to maintain the status quo.

Incidentally this helps explain why some CFS sufferers have such problems with drug medication and indeed this may help to point towards treatment. All my CFS patients feel much worse on statins because these stop the body from making its own Co Q10. Beta blockers, tricyclic antidepressants and phenothiazines also block Co Q10 synthesis and interfere directly with mitochondrial function – they must be used in small doses and with great care and preferably not at all!

Sources of supplements

Co-enzyme Q10 100-400mgs daily. This must be in a hydrosoluble or oil form or it is not well absorbed. Co Q10 is fairly widely available.

Acetyl L-carnitine 2gms daily – this is an amino acid with highest levels in meat. This may explain why vegetarians are at risk of CFS. It also partly explains why my CFS patients do best on high protein diets. I can supply 120gms for £11.50. Also eat red meat (the word carnitine comes from carne – meat) or take 2 g on the day when you have not eaten red meat.

D-ribose 5-15gms daily – needs to be taken throughout the day. I can supply to my patients cost £26.45 for 500grams (100 teaspoonfuls) plus £4 p and p.

Niacinamide 550mgs available from Solgar 01782 634 744. Also see www.puritan.com. I can also supply this.

Magnesium in Myhill's Magic Minerals.

How long before you see improvement?

This takes some months. If you are not improved in this time then look for other causes.

What is important is that these interventions are done in combination with all my other recommendations with respect to diet, micronutrients, pacing, sleep, detoxing, etc. Firstly get the regime tight, then start to feel better and then start to increase activity. Below is a typical daily regime of nutritional supplements for patients who have done the mitochondrial function test and require the whole package of supplements!

Daily regime of nutritional supplements

This daily regime of nutritional supplements comprises my standard supplements that all patients should have regardless of their problems, with the mitochondrial support as a bolt-on extra and the antioxidant support also as an extra as dictated by the tests that have been done. Some supplements have more than one function e.g. Co-Q 10 is essential for mitochondrial function and also an important antioxidant. *Supplements in italics go into drinks*

• Also see VITAMINS AND MINERALS p. 46

Standard for all

In ½ to 1 pint of water/

some fruit juice dissolve:

Ascorbic acid 1 g (1 small scoop)

(Or BioCare Vit C 1 g = 2x 500mg caps)

MMM 2 grams (2 small scoops)

(SODase)

Swallow before breakfast with

the above solution:

BioCare Adult multivitamins x 1 capsule

VegEPA 4 capsules

Vitamin Research Vit D3 x 2 caps

Mitochondrial support

M o r n i n g

Acetyl L-Carnitine 1 gram

(1 small scoop)

D-ribose 2.5 grams (1/2 teaspoon)

Extra Anti-oxidants

Copper 1mg (4 drops)

Puritan's Pride

L-Glutathione 250mg (GSH-Px)

Co-Enzyme Q10 100mg x 1 capsule

Niacinamide 500mg x 1 capsule

By injection

Magnesium sulphate ½ ml

B12 ½ ml

Mid morning

D-ribose ½ a teaspoon in

tea or coffee

Midday – lunchtime

Dissolve in ½ pint of water

MMM 1gram 1 scoop

(SODase)

D-ribose ½ a teaspoon

Manganese 5mgs (4 drops)

Swallow:

Co-enzyme Q10 100mg x 1 capsule

Mid-afternoon

Dissolve D-ribose ½ a teaspoon in tea or coffee

Evening

Dissolve in ½ to 1 pint of water/

some fruit juice:

Ascorbic acid 1 gram

(Or BioCare Vit C 1 g = 2x 500mg caps)

MMM 2 grams

(or adjust to complete your daily dose)

With the above solution swallow

the following caps with food:

VegEPA

After 1 months stop evening dose of VegEPA

Acetyl L-carnitine 1 gram

Zinc 30mgs (8 drops)

D-ribose ½ a teaspoon

Co-enzyme Q10 100mg 1 capsule

Magnesium – treating a deficiency

I have struggled for over twenty years to try to make sense of red cell magnesium results. It seems that they are almost invariably low in patients with chronic fatigue syndrome. Furthermore, so many patients with chronic fatigue syndrome do benefit from magnesium by injection. You could argue that I have been a bit naughty in the past by using a low intracellular magnesium as an excuse for trying magnesium injections! This is really to encourage GPs to use the injections because clinically they are so helpful, although often paradoxically when I repeat a red cell magnesium, it is only marginally better, but magnesium injections often afford marked improvement clinically.

I actually now believe that a low red cell magnesium is a symptom of mitochondrial failure. It is the job of mitochondria to produce ATP for cell metabolism and about 40% of all mitochondrial output goes into maintaining calcium/magnesium and sodium/potassium ion pumps. I suspect that when mitochondria fail, these pumps malfunction and therefore calcium leaks into cells and magnesium leaks out of cells. This, of course, compounds the underlying mitochondrial failure because calcium is toxic to mitochondria and magnesium necessary for normal mitochondrial function. This is just one of the many vicious cycles we see in patients with fatigue syndromes.

The reason for giving magnesium by injection is in order to reduce the work of the calcium/magnesium ion pump by reducing the concentration gradient across cell membranes.

So, a low red cell magnesium is an indication for giving magnesium by injection. Doing this makes the work of the ion pumps less and therefore helps mitochondria to work better.

This explains why it is a waste of time measuring serum magnesium. Serum levels are maintained at the expense of intracellular levels. If serum levels change this causes heart irregularities and so the body maintains serum levels at all cost. It will drain magnesium from inside cells and indeed from bone in order to achieve this.

Having said that, getting serum levels as high as possible will make the job of the calcium/magnesium ion pump much easier. Therefore intracellular levels can be improved by taking magnesium supplements. There are lots of different ways one can do this. The only way I can guarantee to get magnesium levels up is by using magnesium by injection.

I have yet to see a red cell magnesium result which is too high. However it is theoretically possible to overdose with magnesium in people with kidney failure.

Some people never manage to get their red cell magnesium levels into the normal range and one has to settle for low normal or levels just outside the normal range. Dr John McLaren-Howard tells me that there is actually a biphasic normal distribution of magnesium. Because I see low magnesium almost routinely in patients with fatigue syndromes, I just wonder if this vicious cycle of low magnesium and fatigue has a genetic predisposition.

Magnesium by mouth

Are you taking enough magnesium in the diet? The recommended daily allowance is 300mgs for men, 350mgs for women. Magnesium is extremely safe by mouth – too much simply causes diarrhoea. Try increasing the amount of magnesium you take by mouth until it causes diarrhoea, then reduce the dose slightly so it does not. This is called taking magnesium to bowel tolerance (just like using vitamin C to bowel tolerance).

The richest source of magnesium in the diet is from chocolate (yippee, but care with the sugar!), nuts, green vegetables and seeds. Use a magnesium rich salt such as Solo. Use a bottled water rich in magnesium. Hard water also contains more magnesium than soft water. Most processed foods are low in magnesium.

As a routine I like all my patients to take the Myhill Magic Minerals, which is rich in magnesium in balance with all other essential trace elements that are permitted. If this does not do the trick, add in other magnesium salts such as Epsom salts (try between ¼ and 1 teaspoon daily dissolved in a little warm water and gulped down, followed by a nice drink – too much gives diarrhoea, but the right amount can help with constipation), magnesium citrate, chelated magnesium, magnesium EAP etc. If there is also a problem with ACID-ALKALI BALANCE then magnesium carbonate would be a good option.

Is magnesium's absorption blocked?

Calcium and magnesium compete for absorption and so too much calcium in the diet will block magnesium absorption. Our physiological requirement ratio for calcium to magnesium is about 2:1. In dairy products the ratio is 10:1. So, consuming a lot of dairy products will induce a magnesium deficiency.

Tea contains tannin, which binds up and chelates all minerals including magnesium. If tea is to be drunk, don't have it with food. Incidentally, tea drinking is a common cause of iron deficiency anaemia in the UK for this same reason.

Vitamin D is necessary for the body to utilise magnesium. The only significant source of vitamin D is direct sunshine on the skin (no effect through glass). Only a small amount is required to make a difference – 10 minutes a day on the face and hands has an effect. One hour of whole body sunshine in summer can produce 10,000iu! The RDA for vit D is set ridiculously low at 400iu – in America it has just been raised further, but I like people to have at least 2,000iu and many people I recommend 10,000iu daily. At this level of dosing there are no side effects and no toxicity. In winter in our climate we should all be taking vitamin D.

Hypochlorhydria – magnesium requires an acid environment for its absorption and hypochlorhydria will result in poor magnesium absorption. See HYPOCHLORHYDRIA and HEARTBURN – AT LAST I HAVE SUSSED OUT WHY THIS IS SUCH A COMMON PROBLEM. Actually I see this problem very commonly in CFS!

Are you a magnesium loser?

- All diuretics will make you pee out magnesium. By this I do not just mean drugs, but also tea, coffee and alcohol. Even some herbal teas are mildly diuretic.
- Hyperventilation makes you pee out magnesium. This is because hyperventilation induces a respiratory alkalosis, the body pees out bicarbonate to compensate, but each bicarbonate is negatively charged and carries a positively charged cation with it – in this case magnesium.
- Heavy exercise makes you pee out magnesium. This should not be a problem for CFS patients (although many are ex-athletes!) but does explain why long distance runners may suddenly drop dead with heart dysrhythmias.
- Magnesium is lost at times of stress. This also includes hypoglycaemia, food allergy reactions and detoxification.

Can you hang on to magnesium?

- For magnesium to be retained inside cells you need good cell membranes. The two important facets of cell membranes are:
- Have good antioxidant status - see ANTIOXIDANTS.
- Have good levels of fats and Essential Fatty Acids in the diet. See GOOD FATS AND BAD FATS.
- Boron is necessary for normal calcium and magnesium metabolism. Calcium and magnesium metabolism is of critical importance in livestock. Indeed, all vets will tell you the dramatic effects injecting these minerals have on cows which go down at calving time. What is interesting is that they don't just inject calcium and magnesium - they actually inject calcium and magnesium borogluconate - i.e. it seems that the boron is also important in calcium/magnesium metabolism. Boron is of proven benefit in arthritis. It is in the MMMs but additional amounts are present in my Action Against Arthritis mix. See ARTHRITIS – NUTRITIONAL TREATMENTS.

Magnesium absorption through the skin

A recent paper by Rosemary Waring from Birmingham has been very helpful. She did experiments with people looking at the absorption of Epsom Salts in the bath. A 15 minute bath at 50°C with a 1% solution of Epsom Salts caused significant rises in plasma magnesium and sulphate levels together with an increase in magnesium excretion in the urine. To achieve a 1% solution, a standard UK bath of 15 gallons requires 600grams, (just over a 1lb) of Epsom Salts. The water should feel slightly soapy. In this experiment there were no adverse effects, indeed 2 of the volunteers who were over 60 years of age commented without prompting that their rheumatic pains had disappeared.

Magnesium chloride could also be given through the skin. Again there is good scientific work showing that magnesium chloride is well absorbed through the skin. The recipe for this is a 33% solution of magnesium chloride. So if you take 333grams of magnesium chloride (I can supply) into a jug and make this up to a litre this will give you the correct solution. You may have to warm this up for it to be completely dissolved. Or you could add a bit more water - it really doesn't matter. The daily dose is then 10mls (or more) rubbed onto skin. Use soft skin such as in the tummy or in the armpits or inside the thighs, don't wash it off subsequently but every day add to magnesium on site – as the levels build up the absorption will be improved.

A supplier of Epsom Salts is www.justasoap.co.uk - you can purchase it as 1 kg or 25 kg



Magnesium by Injection

The only way that I can guarantee to raise serum magnesium to a therapeutic level is to give it by injection. I prefer people to use the small volume daily injections. Because the magnesium is a hypertonic solution it can sting, so adding a little lignocaine and giving it slowly at blood heat all helps.

Giving yourself a magnesium injection

Use a 0.5ml disposable insulin syringe. The needle is very fine and this makes for a virtually painless injection. Take off the protective white cap over the plunger and the orange cap over the needle. The plunger is set at 0.05ml, so push this down so there is no air in the barrel of the syringe. Firstly draw up about 0.05ml of lignocaine, then fill up the rest of the syringe with magnesium sulphate. This gives you about 0.55ml of clear liquid.

You can inject in several different sites. Start with the roll of fat round the tummy button that everyone has when they sit down. This is where most diabetics inject. You can also use the flesh of the leg between the knee and the hip (your lap) is fine, as is the upper outer quadrant of the buttock. Hold the syringe like a dart, rest the needle against the skin at 90° (right angles) to the skin, push gently, bit harder, until suddenly the needle slides through. You just have to go through the skin. Inject slowly over say 30 seconds, then withdraw the syringe when empty. Hold a wad of cotton wool firmly against the site for one minute.

Then massage the area of injection gently for at least FIVE MINUTES to disperse the magnesium. Despite this some people get injection lumps, not serious, and disperse with time. **DISPOSE OF THE SYRINGE AND NEEDLE SAFELY IN THE ENCLOSED SHARPS BIN. DO NOT RE-USE NEEDLES!** Take full sharps bins to either your GP surgery or local hospital for safe disposal.

I prefer these subcutaneous injections because they will cause less tissue damage and bruising compared to the intramuscular injection.

Larger volume injections

If you can't face injecting yourself several times a week then larger volume injections can be given weekly. A suggested regime is 1gm/2mls given i.m. weekly for 10 weeks.

The injection is painful because one is injecting a hypertonic solution. It is best given at room temperature or blood heat, i.m., either into triceps or deltoid, slowly over 1-2 minutes. For a 2ml injection I usually use an orange needle, at least 1 inch long to get deep into the muscle. Magnesium is a powerful vasodilator. Even if one takes care to check the tip of the needle is not in a vein, sometimes there is such a powerful local vasodilatation that the vessels open up and an i.v. injection is inadvertently given. This does not matter much, except that the patient develops a generalised vasodilatation, feels hot and alarmed, goes red and may faint (if upright).

In fact it is partly this effect which is taken advantage of in the treatment of acute myocardial infarction or acute stroke. In both these conditions there is a local obstruction of blood supply. I use i.v. magnesium (2-5mls of 50%) as a bolus to treat both these conditions - often with dramatic effects. With acute MIs there is often immediate pain relief as either the obstruction is relieved or good collateral circulation restored. Furthermore, magnesium is anti-arrhythmic. Trials with magnesium have clearly demonstrated benefit and magnesium is used as a front line drug in many hospitals (2). In acute stroke, function can be restored within a few minutes - most satisfying. However, if there is a possibility that the stroke is haemorrhagic (about 15% of cases) then magnesium should not be used.

The problem with magnesium by injection is that it is a concentrated solution – it has to be to get enough in to make it worthwhile! However, I have found that giving small amounts often (daily or every other day at first), combined with lignocaine to numb the site, works very well. I now have in stock injectable magnesium solution in 50 ml bottles, sufficient for 100 mini-injections. Although these are supposed to be single dose bottles, actually a concentrated solution of magnesium is its own preservative and they can be safely used as a multidose bottle. This is now my preferred method of administration.

How long should injections continue for?

At least 10 weeks at the above rates of dosing. If the injection sites get sore, you can try moving to other methods, eg, oral, skin, bath, per rectum or nebuliser.

After 10 weeks, adjust the frequency according to how you feel – a typical regime would be 2-3 injections per week (of the 0.5ml injections) for 10 weeks, then 1 per week long term.

Ref: 1. Lancet 337: 757-60 (1991).

2. Lancet 339, 1553-1558 (1992) "Intravenous magnesium sulphate is a simple, safe and widely applicable treatment. Its efficacy in reducing early mortality of myocardial infarction is comparable to, but independent of, that of thrombolytic or antiplatelet therapy". Woods KL, Fletcher S, Roffe C, et al.



Injections of Vitamin B₁₂ – rationale for using

Over the last 22 years of treating over 3,000 patients with chronic fatigue syndrome, I have developed a programme of treatment which I believe all patients must do as the foundation before proceeding to other treatments. Vitamin B₁₂ by injection I see as an integral part of this programme and it is effective for many, regardless of the cause of their chronic fatigue syndrome.

Those patients who respond to B₁₂ are not obviously deficient in B₁₂, indeed blood tests usually show normal levels. The “normal” levels of B₁₂ have been set at those levels necessary to prevent pernicious anaemia – this may not be the same as those levels for optimal biochemical function. B₁₂ has a great many other functions as well as the prevention of pernicious anaemia. However what is interesting is how B₁₂ is beneficial in so many patients with fatigue, regardless of the cause of their CFS, and suggests that there is a common mechanism of chronic fatigue which B₁₂ is effective at alleviating.

Many of the symptoms of CFS are caused by poor antioxidant status. Normal cell metabolism constantly produces free radicals. That is to say you cannot live without producing free radicals. These are highly reactive potentially very dangerous unstable molecules (because, for the chemists amongst you, they have an unpaired electron). Happily the body has evolved many systems for mopping up these free radicals before they cause too much damage. Inside mitochondria the most important are co enzyme Q 10 and manganese dependent superoxide dismutase, outside mitochondria we have zinc copper dependent superoxide dismutase, glutathione peroxidase, acetyl L carnitine (it does more than one job!), as well as vitamins A, C and E and lots of other natural antioxidants found in nuts seeds and vegetables. Where there is poor antioxidant status, high dose vitamin B12 takes over many of their functions. This is why the effect of B12 injections is often so obvious and running out of B12 equally obvious.

General mechanism by which B₁₂ relieves the symptoms of CFS

Professor Martin Pall has looked at the biochemical abnormalities in CFS and shown that sufferers have high levels of nitric oxide and its oxidant product peroxynitrite. These are free radicals. These substances may be directly responsible for many of the symptoms of CFS and are released in response to stress, whether that is infectious stress, chemical stress or whatever. B₁₂ is important because it is the most powerful scavenger of nitric oxide and will therefore reduce the symptoms of CFS regardless of the cause.^{1, 2, 3, 4, 5, 6}

Nitric oxide is known to have a detrimental effect on brain function and pain sensitivity. Levels are greatly increased by exposure to chemicals such as organophosphates and organic solvents⁷. When sensitive tests of B₁₂ were applied (serum methylmalonic acid and homocysteine) before and after B₁₂ therapy, the following symptoms were noted to be caused by subclinical B₁₂ deficiency: parasthesia, ataxia, muscle weakness, hallucinations, personality and mood changes, fatigue, sore tongue and diarrhoea.⁸

B₁₂ in fatigue syndromes

The “foggy brain” with difficulty thinking clearly, poor short term memory and multitasking are often much improved by B₁₂.^{9, 10, 11} Mood and personality changes, so often a feature of patients with chemical poisoning, can be improved by B₁₂.¹² The physical fatigue and well being are often both improved.

A study

Twenty eight subjects suffering from non-specific fatigue were evaluated in a double-blind crossover trial of 5 mg of hydroxocobalamin twice weekly for 2 weeks, followed by a 2-week rest period, and then a similar treatment with a matching placebo. The placebo group in the first 2 weeks had a favourable response to the hydroxocobalamin during the second 2 week period with respect to enhanced general well being. Subjects who received hydroxocobalamin in the first 2-week period showed no difference between responses to the active and placebo treatments, which suggests that the effect of vitamin B12 lasted for over 4 weeks. It is noted there was no direct correlation between serum vitamin B12 concentrations and improvement. Whatever the mechanism, the improvement after hydroxocobalamin may be sustained for 4 weeks after stopping the

medication. "A Pilot Study of Vitamin B12 in the Treatment of Tiredness," Ellis, F.R., and Nasser, S., *British Journal of Nutrition*, 1973;30:277-283.

Practical Details

Do not bother to measure blood levels of B12 to monitor treatment. These are irrelevant. The idea is to get high levels, ie >2000.

Vitamin B₁₂ has no known toxicity and B₁₂ surplus to requirement is simply passed out in the urine (which may discolour pink). It is theoretically possible to be allergic to B₁₂ but in the thousands of injections that I have sanctioned this has only ever occurred after several injections and causes local itching, redness and swelling (although the commonest cause of redness and swelling is poor injection technique). It does not seem to matter whether hydroxocobalamin or cyanocobalamin is used. Again the most painless injections are done using insulin syringes and giving ½ ml daily, then adjust the frequency according to response – some patients will respond straight away, some need several doses before they see improvement. I would do at least 6 weeks of injections before giving up.

I was interested to hear that the top chess players inject themselves daily with B12 when they are competing because it helps their concentration and performance!

References:

- (1) Pall ML. Elevated, sustained peroxynitrite level as the cause of chronic fatigue syndrome. *Medical Hypotheses* 2000;54:115-125. Pall ML. Elevated peroxynitrite as the cause of chronic fatigue syndrome: Other inducers and mechanisms of symptom generation. *Journal of Chronic Fatigue Syndrome* 2000;7(4):45-58.
- (2) Pall ML. Cobalamin used in chronic fatigue syndrome therapy is a nitric oxide scavenger. *Journal of Chronic Fatigue Syndrome*, 2001;8(2):39-44.
- (3) Pall ML, Satterlee JD. Elevated nitric oxide/peroxynitrite mechanism for the common etiology of multiple chemical sensitivity, chronic fatigue syndrome and posttraumatic stress disorder. *Annals of the New York Academy of Science* 2001;933:323-329.
- (4) Pall ML. Common etiology of posttraumatic stress disorder, fibromyalgia, chronic fatigue syndrome and multiple chemical sensitivity via elevated nitric oxide/peroxynitrite, *Medical Hypotheses*, 2001; 57:139-145.
- (5) Pall ML. Levels of the nitric oxide synthase product citrulline are elevated in sera of chronic fatigue syndrome patients. *J Chronic Fatigue Syndrome* 2002; 10 (3/4):37-41
- (6) Pall ML. Chronic fatigue syndrome/myalgic encephalitis. *Br J Gen Pract* 2002;52:762. Smirnova IV, Pall ML. Elevated levels of protein carbonyls in sera of chronic fatigue syndrome patients. *Mol Cell Biochem*, in press.
- (7) Pall ML. NMDA sensitisation and stimulation by peroxynitrite, nitric oxide and organic solvents mechanism of chemical sensitivity in multiple chemical sensitivity. *FASEB J* 2002;16:1407-1417.
- (8) Neuropsychiatric disorders caused by cobalamin deficiency in the absence of anaemia or macrocytosis J Lindenbaum et al *New Engl J Med* 1988; 318: 1720-1728.
- (9) MacDonald Holmes J. Cerebral manifestations of vitamin B12 deficiency. *Br Med J* 1956; 2: 1394-1398.
- (10) Ellis FR, Nasser S. A pilot study of vitamin B12 in the treatment of tiredness. *Br J Nutr* 1973; 30: 277-283
- (11) Langdon FW. Nervous and mental manifestations of pre-pernicious anaemia. *J Amer Med Assoc* 1905; 45: 1635-1638
- (12) Strachan RW, Henderson JG. Psychiatric syndromes due to avitaminosis B12 with normal blood and marrow. *Quart J Med New Series* XXXIV 1965: 303-317

What to do if your GP refuses to give the B12 and magnesium injections

This is a real bore. Magnesium and B12 injections are so helpful that it is pointless progressing onto other things without trying these first. Therefore a way must be found to get this done. Some GPs are unwilling to prescribe the magnesium and B12 but prepared to inject them. In this event I can supply the magnesium and B12 and the GP's practice nurse should be able to inject.

The next possibility is that the GP refuses to have anything to do with magnesium and B12 injections. In this event either you need to find a local nurse, physio, health visitor or mid-wife or whoever who can do the injections for you. I am very happy to write a covering letter so that I take clinical responsibility, send that person instructions as to how to inject B12 and magnesium and I can supply the wherewithal.

The third possibility is that I teach you to inject yourself. This has great advantages because the timing of the magnesium and B12 depends on your clinical symptoms. Some people know exactly how long the injections last and if they are going through a good phase they last longer, shorter with a bad phase. Sometimes more benefit is got from the B12 than magnesium or vice-versa and the injections can be adjusted accordingly. However you really need to come and see me so that I can teach you to inject yourself, or alternatively be taught by a competent local practitioner such as a doctor or nurse. Many of my patients do end up injecting themselves simply because this saves the effort of travelling down to their GP's surgery on a regular basis and risk picking up nasty infections in the waiting room.

I am now getting fairly confident that the magnesium by nebuliser works as well as magnesium by injection, so I would probably go for this. I have yet to try B12 by nebuliser, but I am trying some patients on high dose oral supplements to see if I can get the same effect as injections.



Early feedback from patients doing the mitochondrial regimes and implications for future treatment

September 2008

I have now had over 500 patients do the package of treatment to support mitochondria and I am starting to get some clinical feedback as to the results. The first point of interest is that when I repeat the mitochondrial function tests they nearly always show improvement. That is to say the package of supplements is effective at treating the biochemical lesion. This begs the question, therefore, as to whether this is translating into clinical results.

What seems to be happening is that response to this package of treatment takes months, not weeks. However, what is interesting is that improvement seems to continue during the ensuing months, i.e. it is ongoing and progressive. This is very exciting for me – many sufferers have got back to regular exercise and some to part time work. Therefore as a rough rule of thumb I expect to see improvement starting during the first three months of treatment, but I would not give up with this package until that person had at least six months of the full package of treatment.

What most often gets in the way is allergy – if people do not tolerate the supplements then there are some wrinkles that can be tried. One is to rotate them – that is to say on a Monday have the D-ribose, Tuesday, Acetyl L-carnitine, Wednesday Co-Q10, Thursday magnesium etc. This helps to avoid new allergies developing. Intolerance of Co-enzyme Q10 can sometimes be got round by giving it through the skin rather than taking it by mouth. Another way forward is to use EPD (Enzyme Potentiated Desensitisation) to switch off allergies and reduce the sensitivities generally.

The key point to remember about chronic fatigue is that it is a symptom, not a diagnosis and if the mitochondrial package is not working then one needs to re-visit all other areas, namely allergy, diet, insomnia, thyroid and adrenal function, antioxidant status, hyperventilation, chronic low grade infection and other things I may yet discover.

PART IV: SOLID FOUNDATIONS FOR RECOVERY AND GOOD HEALTH



I have to confess that I started this book with the account of the biochemical processes involved in producing energy in our bodies, the exciting news of the detailed tests looking at how efficient or inefficient these processes are in the CFS patient's cells and finally a discussion of the supplement regime to correct problems with energy production. These recent developments in our understanding of chronic fatigue syndrome mean that the search for safe, targeted and effective treatment for this dreadful illness is within reach of all sufferers.

However, there is a very important message that CFS sufferers need to always remember. Just as a house without solid foundations cannot be expected to be safe and last very long, regardless of how expensive the window frames are and how thick and expensive the roof timbers are, so chronic fatigue syndrome cannot be overcome and the recovery cannot be sustained without the "foundations" on which the mitochondrial supplement regime rests. These foundations for chronic fatigue sufferers, and in fact for anybody who wants to keep their good health, are:

- Rest and pacing
- Stone Age diet
- Nutritional supplements
- Adequate sleep
- Chemical clean-up

Although this chapter follows recommendations for the treatment of mitochondrial dysfunction in CFS, the foundations of recovery and continued good health ideally need to be in place before that mitochondrial package is introduced. You will find these principles on the website under "Your Very Good Health".

Rest and pacing: Drive your car kindly, and then it lasts much longer!

Rest is the single most important factor in allowing CFS sufferers (CFSs) to get better. An invariable feature of the history is that exercise (either mental, physical or emotional) makes the symptoms worse. Indeed this distinguishes CFS from depression - exercise tends to improve people who are simply depressed. In CFS the desire is there but the performance lacking. However, all CFSs tend to push themselves to their particular limit every day and therefore do not give themselves a chance to

get better. This means they have one day doing as much as possible, then three days to recover. Whilst you are on this roller coaster ride of activity and dives, you cannot hope to improve overall.

Fatigue and pain are the symptoms that prevent the body from damaging itself. Ignore these at your peril! Usually it is years of stress and push that pre-date the onset of CFS. People get things done at the expense of sleep, holidays and diet and end up feeling tired with the progressive cell damage that goes with that. Then a virus or toxic stress pushes one finally over the edge.

Energy has to be carefully rationed so that every day is about the same. This is the most difficult aspect of treating CFS because this is the very personality that makes people get CFS in the first place.

We now know why CFSs get delayed fatigue – it is because when they use up energy (ATP) faster than they can make it, there is a build up of ADP. Some is shunted into AMP, which is only recycled very slowly, if at all. Cells have to make brand new de novo ATP from D-ribose, but this only happens very slowly, 1-4 days. In the meantime, cells can get a small amount of ATP directly from glucose via anaerobic metabolism, but this produces lactic acid, which causes many of the muscle symptoms.

Most CFSs compare themselves to what they were like before their illness began. This is hopeless. It is vital to work out exactly how much you can or can't do in a day - and then do less.

Imagine that a normal healthy person has £1,000 worth of energy to spend in a day. The CFSs only have £100. What is more, this has to be spread out throughout the day in such a way that they have £20 "change" at the end. This will then allow recovery to occur. Furthermore you are only allowed to spend a few pounds in one session – then rest. If you start to get symptoms then you are over-doing things. Often this means you have initially to do LESS – but with careful pacing you will end up doing MORE!

I also like all my CFSs to have a sleep in the day, even on a good day. Homo sapiens evolved in hot climates where it is normal to have a siesta in the afternoon. Most people experience an energy dip after lunch. Young babies and older people return to this more normal sleep pattern and ill people should do the same. An afternoon sleep is normal! I do!

You have to pace sufficiently so that you feel OK at rest. This may also need other interventions, but feeling unwell means tissue damage!

Resting in the day

By resting, I mean complete rest from exercise, visitors, telephone calls, reading, computers, talking, child minding, noise and TV. All the above count as activities which have to be carefully rationed through the day. When you rest, lie horizontal because this reduces the work of the heart (it is much harder work pushing blood round a vertical body, up hill and down dale, than when horizontal and everything is on the flat). Interestingly caffeine helps the body scavenge AMP, so small amounts in green tea, coffee or dark chocolate can be helpful.

The second point is to have a proper rest, when you actually go to bed, regularly in the day, **EVEN ON A DAY WHEN YOU FEEL WELL**. The fatigue in CFS is delayed. If you push yourself one day, expect to "pay" for it 12-36 hours later. So just because you feel well one day, don't overdo things or you will be worse off the next.

Thirdly, do things in short bursts. You will be more efficient if you do things for 10-40 mins (whatever your window of time is) then rest for the same length of time. I had one patient who could

only walk 30 metres, but by walking 15 metres and resting, then going on again, she got up to walking a mile a day!

Fourthly, vary your activity. This applies to the brain as well as the body – listening to the radio or music uses a different part of the brain to watching TV. Washing up (sitting on a high stool please) uses different muscles to walking.

As you recover

The first step is to reduce the amount of physical and mental work each day until all days are about the same. At the same time you will be putting in place all the necessary interventions to allow recovery – NUTRITIONAL SUPPLEMENTS, STONEAGE DIET, SLEEP etc. Get the regime tight until you get to a stage when you feel absolutely fine doing absolutely nothing! The level of activity is then very slowly increased each day on the proviso that you continue to feel well. The key here is to vary activity. Different parts of the brain and body have to be exercised. One of the most active areas of the cortex is that which is concerned with vision. Processing information from a television for example requires much more activity than listening to music. Television needs to be rationed. Similarly physical exercise should be done using as many different muscle groups and initially should be limited to simple stretching exercises without weights.

The level of physical and mental exercise is very gradually increased. It may well take several months before significant changes are seen. To adjust the level of activity to what is appropriate you have to judge things by the next day. If there is delayed fatigue then you have overdone it. There is a very fine “window” between too much and too little. Straying either way makes CFS worse!

One of my patients, Lydia Noor, has developed a useful technique for rest. Every activity is scored as to whether it is energy giving (e.g. sleep, lying in bed in a darkened room, meditation), energy taking (e.g. dressing, walking, talking, cooking, cleaning etc) or energy neutral (easy reading, easy TV, having a massage etc). Each day is scored in terms of time spent doing each activity and balanced out so energy input equals energy output. Everybody has their own balance. But one can quickly see if too much has been done on any one day, in which case a balancing is necessary. Doing it like this, on a chart, takes the guilt out of resting. It simply becomes a necessity like eating or drinking.

I can recommend Calibre - The Cassette Library, a registered charity providing tapes of books to the blind and print disabled (CFS patients qualify on many scores!). The service is free, the voice on the end of the phone extremely friendly. Contact Calibre Library on: 01296 432 339.

Once you get to the stage when you have good levels of activity and feel fine, then, and only then, dare you relax the regime. This of course is a council of perfection – actually nobody does it this way because life has a nasty habit of getting in the way. There is usually a trade off between how you feel and how much you can do. But the business of feeling ill is a disease amplifying process – it can actually make you worse as cells are damaged – so do work hard at pacing.

Work and pacing

There is a whole spectrum of CFSs from those professional athletes who cannot do their marathons in less than 2 hours 12 mins, to those who are bed-ridden. Some CFSs can manage full time work, but very often are operating "on adrenaline" and crash when they give it up. This crash can last several weeks or months. Many can do some part-time work - in which case late afternoon work is the best. Don't try to change the job you are in - never resign or you will lose valuable rights. I am happy to give sick notes, write to companies/bosses, do letters for early retirement and fill in disability living allowance forms etc for my patients. I never used to charge for these letters, but

because there is so much paper work now, I make a charge reflecting admin/time costs. The mitochondrial function test results are very useful to include in these letters because these give us an objective measure of fatigue.

If you work to your limit, then you should do very little outside work - spend the evenings and weekends resting.

Get organised

The people who get CFS are those who "burn the candle at both ends". They hold down a demanding job, care for a family and are often active sportsmen/women. I see many top athletes with CFS - professional footballers, England cyclists and swimmers, decathletes, many county badminton, hockey, cricket and squash players and several quality marathon runners. These people are the very ones who find it difficult to ask favours of others.

Ask other people to do things. Stop being house-proud. Get a cleaner and dish washer. Simplify your life. Accept offers of "meals on wheels" from others. Standardise shopping lists so you don't need to think each time. Arrange for as much food to be delivered as possible - e.g. have a standing order at the green grocer for fruit and vegetables a week, with the fishmonger, with the butcher, Mr Tesco etc. Many city areas have organic food delivery. Have standard menus every week so you don't need to think about what to eat. Choose foods requiring minimal preparation. Use the internet to order from supermarkets so that foods are delivered to the house directly – a weekly standard “shopping basket” takes energy to set up but takes the mental and physical effort out of shopping thereafter. Take advantage of a washing machine and drier. Give up ironing - a nonsensical, energy sapping waste of time and energy. Ironing came into fashion to kills nits and fleas in the seams of clothes and had a purpose once! I don't iron, but then I always was a scruff!

Do things by the clock. We are creatures of habit and the physical body likes things to happen on a regular basis – you ask any farmer who keeps animals – they thrive on routine. Sleep and eat at regular times and pace activities so you do about the same every day and during the same time slots. I know that life has a habit of getting in the way of this ideal, but as a general principle, stick to it.

I always think life is all about going from one crisis to the next. If every bit of your energy is taken up every day, then you don't have any left in reserve for the crises. This is another good reason not to constantly push yourself to your limit.

THE TEN COMMANDMENTS FOR REDUCING STRESS

1. Thou shalt not be perfect or try to be.
2. Thou shalt not try to be all things to all people.
3. Thou shalt leave things undone that ought to be done.
4. Thou shalt not spread thyself too thin.
5. Thou shalt learn to say “NO”.
6. Thou shalt schedule time for thyself, and for thy supporting network.
7. Thou shalt switch off and do nothing regularly.
8. Thou shalt be boring, untidy, inelegant and unattractive at times.
9. Thou shalt not even feel guilty.
10. Thou shalt not be thine own worst enemy, but thine own best friend.

Vitamins and minerals – what to take and when - *the fuel in the tank*

I believe that if you wish to stay healthy, or recover from almost any illness, then taking nutritional supplements is essential. My reasons are given below. What you should take daily for optimum health is as follows:

Morning

- **BioCare multivitamin/mineral one daily** (this contains B vitamins which can cause insomnia, so don't take in the evening). Contains vit A 2,000 i.u, B1 25mg, B2 25mgs, B3 50mgs, B5 100mg, B6 as its active form pyridoxal-5-phosphate 25mg, B12 30mcg, inositol 12mg, PABA 10mg, biotin 35 mcg, folic acid 400mcg, magnesium ascorbate 243mg (vit C), Vit D₂ 250i.u, Vit E 75i.u. (50mg). Also magnesium 22mg, calcium 6mg, potassium 8.9mg, zinc 8.5mgs, molybdenum 98.7mcg, manganese 300mcg, chromium 50mcg, iodine 37.8mcg, selenium 50mcg
- **Vitamin C 1,000mgs** - the best value source is ascorbic acid. When mixed in water with the MMMs, the minerals convert to the ascorbate, which enhances absorption of the minerals. For two grams of minerals (two scoops) add one gram of vitamin C (one scoop) in a pint of water. With time you may tolerate this in half a pint of water. If ascorbic acid is not tolerated then use the neutral magnesium or calcium ascorbate such as BioCare Vitamin C 500 (as magnesium ascorbate) 2 caps
- **VegEPA** - 4 capsules for one month, then maintenance dose of 2-4 capsules daily
 - ✓ N.B. VegEPA **CONTAINS FISH OILS** SO IF YOU ARE VEGETARIAN, USE: **BioCare MicroCell Essential Fatty Acids** one capsule – contains 173mg linseed oil (provides 95mg of ALA) and 108mg borage oil (providing 43.2mg of GLA) (2 caps Essential Fatty Acids provide the equivalent amount of GLA as 1,000mgs of evening primrose oil).

Evening

- **Vitamin C 1,000mgs** – as above
- **VegEPA** – 4 capsules for 1 month (and then only the morning dose)
 - ✓ or **MicroCell Essential Fatty Acids** one capsule as above

THROUGHOUT THE DAY DRINK MYHILL'S MAGIC MINERALS (MMM)

This is a mix of minerals which you make up in water or fruit juice, all essential for human metabolism which increasingly are lacking in modern food supplies. It contains minerals in the correct proportion for human requirements – the amounts given below are elemental weights of the pure mineral. These amounts are those considered desirable from modern nutrition research and are mostly above the “Recommended Daily Amount”. If better preparations come available or I learn more about essential minerals then the composition of MMM may change.

Per one gram of MMM

Calcium (as calcium chloride) 60 mgs
Magnesium (as magnesium chloride) 70 mgs
Potassium (as potassium chloride) 40 mgs
Zinc (as zinc chloride) 6mgs
Iron (as ferric ammonium chloride) 3mgs
Boron (as sodium borate) 2 mgs

Iodine (as potassium iodate) 0.3 mgs
Manganese (as manganese chloride) 0.2 mgs
Copper (as copper sulphate) 0.2 mgs
Molybdenum (as sodium molybdate) 40 mcg
Selenium (as sodium selenate) 40 mcg
Chromium (as chromium chloride) 40 mcg
Vitamin B12 1,000 mcg
Vitamin D (as cholecalciferol) 1,000 iu

I have omitted some 4 elements for the following reasons: **vanadium** is not permitted in UK. **Sulphur** is not biologically available as the mineral – it is available in sulphur-containing amino acids (eat protein) and in glucosamine sulphate or MSM or N acetyl glucosamine or from boiling bones and using the stock in soups and stews; **phosphorus** is plentiful in meat, is often used as a food additive and is not in the MMM; and **silicon** - cannot be used by the body as an inorganic mineral. Organic silica and strontium are in my arthritis mix.

Dosage

The daily dose of MMM is one gram (one small scoop in ½ pint water) per two stone of body weight (sorry – don't do metric!) to a maximum of 5 grams (5 small scoops made up in 3 pints of water and taken throughout the day). **Start off with just a half a pint of mix daily and build up slowly to allow your stomach to adjust to the changes, otherwise it may cause nausea and loose bowel movements. Use with ascorbic acid to optimise absorption. This it does firstly by combining with the minerals to form ascorbates - the most soluble form, and secondly by acidifying the mix – minerals need an acid environment for their absorption.** With 10% fruit juice this is palatable. It also makes one drink water, something many people forget to do! MMM is suitable for all age groups including babies and pregnant women. The dose is not critical as there is a very wide margin of safety for all essential minerals! The mix is 100% minerals with no additives, colourings, flavourings or any excipients. The formula is completely stable and will last for many years. **However, it is vital that the lid is tightly screwed on to the jar to prevent absorption of moisture from the air.** The mixture may change as I learn new things about nutritional science. MMM is supplied in 405gm containers sufficient for 3 months supply of all minerals for someone weighing 9 stone. Please order MMM from Upper Weston, Llangunllo, Knighton, Powys LD7 1SL, or e-mail: helen@doctormyhill.co.uk

For minerals to be absorbed they require an acid stomach – see HYPOCHLORHYDRIA.

I have been experimenting with delivering minerals and vitamins through the skin rather than by mouth to avoid problems with gut fermentation. For lots of ideas please see MINERALS AND VITAMINS IN CREAMS.

SSSS

Some people do not tolerate the MMM because it is so rich in magnesium, calcium, potassium and iron. For these, change to SSSS (Sarah's Solution for Sensitive Stomachs), which provides 60mgs calcium, 60mgs magnesium, 40mgs potassium per daily dose and contains no iron. 100g (sufficient for 100 days adult dose).

Sunshine

is necessary to make vitamin D. Vitamin D deficiency is extremely common and partly responsible for our epidemics of immune disorders (allergy and autoimmunity), osteoporosis, cancer and heart disease! Vitamin D is extremely safe and I now include it in the MMMs at the rate of 1,000iu per gram. So the maximum daily dose of 5 grams MMMs gives 5,000iu of vitamin D3. Sunshine is the best way to increase vitamin D levels. Thirty minutes of good sunshine on skin exposed by swimming costumes will

give us about 5,000iu of D3. It is impossible to get adequate vitamin D from sunshine in UK, hence the need to supplement. If you are not taking MMMs, then you need to take 5000 i.u. of Vit D3 a day. See VITAMIN D AND SUNSHINE: AN ESSENTIAL VITAMIN.

Salt - if you are not eating processed foods, then you will need some salt. Use sea salt which also contains small amounts of very rare trace elements which are also likely to be essential for normal metabolism. I suggest ¼ tsp. daily on food.

If you think of the human body as a language, then vitamins and minerals are the alphabet. With the letters of the alphabet one can make words, sentences, paragraphs, chapters, books, libraries and a whole culture. All the letters are necessary for complete health. Actually you could go a long way with a language without the letter X. But without X there's no sex and the human race would rapidly become extinct! All micronutrients are essential and we all need to be taking a bit of everything.

Everybody can benefit from taking nutritional supplements regularly. I do. My reasons are as follows:

1. We evolved over millions of years requiring a high calorie diet. Man was physically active requiring energy to keep warm, hunt, gather, fish and fight. Modern man is a lounge lizard by comparison. We simply do not need to eat as much. Because we eat less calories, we eat fewer vitamins, minerals and essential fatty acids which would accompany those calories.
2. There is a one way cycle of trace elements from the soil, into plants and animals, into us, then out into the sea. We are not recycling composted human sewage onto the land and so we are out of balance. Trace elements in the soil are being depleted and not replaced, so we too are becoming deficient.
3. Plants cannot absorb trace elements directly from the soil. They rely on fungi called mycorrhiza which cover the root hairs, absorb soil water and trace elements and put them into a bioavailable form for the plants to absorb. Artificial nitrogen and pesticides kill mycorrhiza and so chemical farming gives us malabsorbing plants.
4. Plants grown on chemical fertilisers grow rapidly and outstrip their trace element supplies. For example cows put on such 'flushed' grass may develop grass staggers - acute magnesium deficiency.
5. We tend to eat foods which have been processed, so many nutrients are lost, and these losses are accelerated by sugars, caffeine, alcohol and other such social poisons (delightful though they may be!).
6. We are increasingly exposed to toxins which require vitamins and minerals for their excretion. These toxins effectively increase our needs for all nutrients. The commonest cause for iron deficiency anaemia in this country is tea drinking. Tea contains tannin which binds (chelates) trace elements including iron and so blocks their absorption. More obvious toxins include pesticide residues, lead, mercury (in fillings), cadmium (smoking), aluminium (water), volatile organic compounds (perfumes, solvents, exhaust fumes) and so on - a seemingly endless list.
7. The rate of human evolution is accelerating all the time. We are all called upon to make changes to our lives all the time. This is very stressful. Western man has probably never been so stressed on an everyday basis than before and this increases nutritional demands.

98% of all body tissues are replaced every six months. It may take this time to get the full benefit from supplements. My family are hopeless at taking supplements so I put them into the cooking. Fruit salad gets a sprinkling of vitamin C, oils and minerals get squirted into stews, mashed potato and soups. It is impossible to disguise the B vitamins, so they go on the table with breakfast.

You must sleep - *time for service and repair*

All animals, even bacteria, need a time to shut down normal metabolism for the processes of healing and repair. All higher animals do this during sleep. If you get insufficient sleep, your health will gradually ratchet downhill as there is more time for damage to take place and less time for healing and repair.

Humans evolved to sleep when it is dark and wake when it is light. Sleep is a form of hibernation when the body shuts down in order to repair damage done through use, to conserve energy and hide from predators. The normal sleep pattern that evolved in hot climates is to sleep, keep warm and conserve energy during the cold nights and then sleep again in the afternoons when it is too hot to work and hide away from the midday sun. As humans migrated away from the Equator, the sleep pattern had to change with the seasons and as the lengths of the days changed.

Get the hours of sleep

People needed more sleep during the winter than in the summer in order to conserve energy and fat resources. Furthermore during the summer humans had to work long hours to store food for the winter and so dropped the afternoon siesta. But the need for a rest (if not a sleep) in the middle of the day is still there. Therefore it is no surprise that young children, elderly and people who become ill often have an extra sleep in the afternoon and for these people that is totally desirable. Others have learned to “power nap”, as it is called, during the day and this allows them to feel more energetic later. If you can do it then this is an excellent habit to get into – it can be learned! The average daily sleep requirement is nine hours, ideally taken between 9.30pm and 6.30am, i.e. during hours of darkness, but allow for more in the winter and less in the summer. An hour of sleep before midnight is worth two after – this is because human growth hormone is produced during the hours of sleep before midnight.

To show how important the balance of hours of sleep and rest are, divide the day into 12 hours of activity and 12 hours of rest. If you have one extra hour of activity (13 hours), you lose an hour of rest and sleep (11 hours). The difference is two hours!

Sleep when it is dark

Light on the skin prevents the production of melatonin, which is the sleep hormone essential for a good night's sleep. Therefore, the bedroom should be completely blacked out and quiet in order to give the best chance of quality sleep. Even people who are born blind still have a day night rhythm – it is light landing on the skin which has the effect – just closing your eyes will not do it! A study done in 1907 before electricity was available showed that people went to bed when it got dark and rose when it got light. On average through the year they got 9 hours sleep, more in winter, less in summer. Nowadays we average 7 and a half hours of sleep – we are losing on average 550 hours of sleep a year! Loss of sleep is a major risk factor for heart disease, cancer and degenerative conditions! We damage our cells during waking hours, and heal and repair during sleep – get the balance wrong and one ratchets downhill with time with not enough time to heal and repair the damage created during wakeful hours!

Sleep is essential for life

After the First World War a strain of Spanish ‘flu swept through Europe killing 50 million people worldwide. Some people sustained neurological damage and for some this virus wiped out their sleep centre in the brain. This meant they were unable to sleep at all. All these poor people were

dead within 2 weeks and this was the first solid scientific evidence that sleep is more essential for life as food and water. Indeed all living creatures require a regular “sleep” (or period of quiescence) during which time healing and repair takes place. You must put as much work into your sleep as your diet.

The desire for sleep does not come up and up slowly through the evening. It comes in waves. We get a sleep wave every 90 minutes. Work out from when you do drop off to sleep when your wave occurs, eg if you drop off now at 11pm, you have missed the 9.30 wave. Once you start to look for the wave it is very obvious! Again, if you nod off in front on the TV at 8pm, that tells you when your sleep wave has come. Get into bed before the sleep wave, recognise it, lights out, then “ride the wave” with your sleep dream.

We are all creatures of habit and the first essential is to get the physical essentials in place.

- A regular pre-bedtime routine – your “alarm” should go off at 9pm, at which point you drop all activity and move into your bedtime routine.
- A regular sleep time so you ride the sleep wave.
- Learn to recognise the sleep wave.
- A busy day with the right balance of mental and physical activity.
- Not having a bed fellow who snores.
- Small carbohydrate snack just before bedtime (eg nuts, seeds) helps prevent nocturnal hypoglycaemia, which often manifests with vivid dreams or sweating or waking in the night.
- Perhaps restrict fluids in the evening if your night is disturbed by the need to pee.
- No stimulants such as caffeine or adrenaline inducing TV, arguments, phone calls, family matters or whatever before bedtime! Caffeine has a long half life – none after 4pm.
- Dark room – the slightest chink of light landing on your skin will disturb your own production of melatonin (the body’s natural sleep hormone) – have thick curtains or blackouts to keep the bedroom dark – this is particularly important for children! Do not switch the light on or clock watch should you wake.
- A source of fresh, preferably cold, air.
- A warm comfortable bed – we have been brainwashed into believing a hard bed is good for you and so many people end up with sleepless nights on an uncomfortable bed. It is the shape of the bed that is important. It should be shaped to fit you approximately and then very soft to distribute your weight evenly and avoid pressure points. Tempur mattresses can be helpful (if expensive) as are water beds.
- If your sleep is disturbed by sweating then this is likely to be a symptom of low blood sugar.
- Another common cause of disturbed sleep is hyperventilation which often causes vivid dreams or nightmares. See my section on HYPERVENTILATION – this can now be tested for by measuring a red cell carbonic anhydrase. However I often use a benzodiazepine such as diazepam 2-5mgs at night which reduces the sensitivity of the respiratory centre.
- If sleep is disturbed by pain then one must just take whatever pains killers are necessary to control this. Lack of sleep simply worsens pain.
- If one wakes in the nights with symptoms such as asthma, chest pain, shortness of breath, indigestion etc then this may point to food allergy being the problem with these withdrawal symptoms occurring during the small hours.
- Some people find any food disturbs sleep and they sleep best if they do not eat after 6pm.
- If you do wake in the night do not switch the light on, do not get up and potter round the house or you will have no chance of dropping off to sleep.
- Learn a “sleep dream” to train the subconscious to switch on the sleep button!

THE COMMONEST CAUSE OF DISTURBED SLEEP IN THE NIGHT IS HYPOGLYCAEMIA. Once the STONEAGE diet is established, this often helps considerably with sleep, but in the meantime have a snack last thing at night (eg nuts and seeds with a small piece of fruit) and if disturbed maybe eat again in the night.

Recognise the sleep wave

Actually sleep does not gradually creep up on us during the evening – it comes in waves. There is a sleep wave about every 90 minutes and you will get to sleep most efficiently if you learn to recognize and ride the sleep wave. Often there is a lesser one earlier in the evening when people drop off to sleep in front of the telly, or they jump and make a cup of tea to wake themselves up because “they are not ready to go to bed” – actually they are! My sleep wave comes at 9.20 and I like to be in bed reading well before this – it is immediately recognizable now I have learnt to expect it!

Get the brain off to sleep

Getting the physical things in place is the easy bit. The hard bit is getting your brain off to sleep. I learned an astonishing statistic recently which is that throughout life, the brain makes a million new connections every second!! This means it has a fantastic ability to learn new things. This means it is perfectly possible to teach your brain to go off to sleep, it is simply a case of pressing the right buttons. Getting off to sleep is all about developing a conditioned reflex. The first historical example of this is Pavlov’s dogs. Pavlov was a Russian physiologist who showed that when dogs eat food, they produce stomach acid. He then “conditioned” them by ringing a bell whilst they ate food. After two weeks of conditioning, he could make them produce stomach acid simply by ringing a bell. This of course is a completely useless conditioned response, but it shows us the brain can be trained to do anything.

Applying this to the insomniac, firstly, he has to get into a mind-set which does not involve the immediate past or immediate future. That is to say if he is thinking about reality then there is no chance of getting off to sleep – more of this in a moment. Then he uses a hypnotic (see below) which will get him off to sleep. He applies the two together for a period of “conditioning”. This may be a few days or a few weeks. The brain then learns that when it gets into that particular mindset, it will go off to sleep. Then the drug is irrelevant. However, things can break down during times of stress and a few days of drug may be required to reinforce the conditioned response. But it is vital to use the correct “mind-set” every time the drug is used, or the conditioning will weaken.

I do not pretend this is easy, but to allow one’s mind to wander into reality when one is trying to sleep must be considered a complete self-indulgence. It is simply not allowed to free-wheel. Treat your novelty seeking brain as you would a naughty, recalcitrant, undisciplined child.

Find a sleep dream that suits you

Everyone has to work out their best mind-set. It could be a childhood dream, or recalling details of a journey or walk, or whatever. It is actually a sort of self hypnosis. What you are trying to do is to “talk” to your subconscious. This can only be done with the imagination, not with the spoken language. The following is lifted from a book on self hypnosis which works for some:

“We know that the hypnotic state is characterized by extreme responsiveness to suggestion. You can use this information for conditioning yourself in self hypnosis. Here is a standard procedure to follow. Lie down in bed, ready for sleep initially with your eyes open (the room needs to be dark). Mentally give yourself the suggestion that your eyes are becoming heavy and tired. Give yourself the suggestion that as you count to ten your eyes will become very heavy and watery and that you will find it impossible to keep your eyelids open by the time you reach

ten. If you find that you cannot keep them open and have to close them, then you are probably under self-hypnosis. At this point deepen the state by again slowly counting to ten. Between each count mentally give yourself suggestions that you are falling into a deep hypnotic state. Give yourself suggestions of relaxation. Try to reach a state where you feel you are about to fall asleep. Give yourself the suggestion that you are falling more deeply down into sleep. Some may get a very light feeling throughout the body; others may get a heavy feeling.

Let us assume that your eyes did not become heavy. Then repeat the procedure. You can count to one hundred if you need this period of time to assure an eye closure. The closing of the eyes is the first sign you are in a receptive frame of mind. Let us assume that you get the eye closure. Take a longer count to get yourself in the very relaxed state. Once you achieve this you should be able to respond properly. The difficult bit is not allowing your brain to wander off into other areas. You must work hard at concentrating on the counting and the responses that achieves.

If you respond properly, give yourself the “post-hypnotic suggestion” that you will be able to put yourself under later by counting to three, or using any specific phrase you desire. Continue using it every day and give yourself the post hypnotic suggestion every time you work with it, that at each succeeding session you will fall into a deeper state and that the suggestions will work more forcefully with each repetition.

Each time that you work towards acquiring the self-hypnotic state, regardless of the depth that you have achieved and whether or not you have responded to any of the tests, give yourself the following suggestions: “The next time I hypnotise myself, I shall fall into a deeper and sounder state” You should also give yourself whatever suggestions you desire as though you were in a very deep state of hypnosis. You may ask “If I’m not under hypnosis, why give myself the suggestions?” You do this so that you will begin to form the conditioned reflex pattern. Keep at it. One of the times that you work at achieving self-hypnosis the conditioned response will take hold.....you will have self hypnosis from that time on. It is like learning to drive a car with a clutch. At first you must consciously go through the process of putting your foot on the clutch and shifting gears. Usually there is a grinding of the gears and you feel quite conspicuous about this, but gradually you learn to do this almost automatically and you gain confidence in you driving ability. The same is true of hypnosis. As you work at you task, you gradually get the feel of it and you achieve proficiency in it.

Use medication to reinforce the sleep dream

I instinctively do not like prescribing drugs. However, I do use them for sleep, in order to establish the above conditioning and to restore a normal pattern of sleep, after which they can be tailed off or kept for occasional use. Indeed, viruses can cause neurological damage (for example polio) and this could involve damage to the sleep centre. So often CFS patients get into a bad rhythm of poor sleep at night, which means they feel ill for the day, which means they get another bad night. They are half asleep by night and half awake by day. Furthermore, their natural time for sleep gets later and later. They go to bed late and if they have to get up at the usual time, chronic lack of sleep ensues. Indeed there is now evidence that the biological clock is dependent on normal adrenal function – and we know this is suppressed in CFS.

So often some medication is needed to facilitate sleep. Most CFS patients react badly to drugs in normal doses. I like to use combinations of low dose herbals, natural remedies and prescribed drugs to get the desired effect. Everybody works out his or her own cocktail which suits. This may have to be changed from time to time. I like to supply a “starter pack” which has a selection of hypnotics to try. Once you have worked out your best combination you can either order it from me, or your GP or whatever is easiest. **Please note that I am only able to prescribe the sleeping drugs, and any other medication listed in this booklet to my patients and not members of the public.** But anybody can purchase and use melatonin (from www.pharmwest.com), valerian and Nytol.

I am always asked about addiction. My experience is that this is rare, especially if drugs are used as above to develop a conditioned reflex. One has to distinguish between addiction and dependence. We are all dependent on food, but that does not mean we are addicted to it. We are all dependent on a good night's sleep for good health and may therefore become dependent on something to achieve that. This does not inevitably lead to addiction. Addiction is a condition of taking a drug excessively and being unable to cease doing so without other adverse effects. Stopping your hypnotic may result in a poor night's sleep but no more than that. This is not addiction but dependence.

Natural preparations and prescription drugs to help sleep

These all work differently and so I like to use low dose combinations until you find something that suits. Choose from the following, and start with:

- Melatonin 3mgs (one tablet). Some people just need 1mg. CFS patients have a poor output of hormones from all their glands namely the hypothalamus, pituitary, adrenals, thyroid and also the pineal gland. The latter is responsible for producing melatonin, the natural sleep hormone. It seems logical to me therefore to try this first. One or two of my patients have become depressed with melatonin, so be aware of this. On the container it also states melatonin should be avoided in autoimmune disorders, but I can find no reason why this should be so.
- Valerian root 400 mg 1-4 capsules at night. This is a herbal preparation which is shorter acting and can be taken in the middle of the night.
- Nytol (diphenhydramine 50mg). This is a sedating antihistamine available over the counter. This is longer acting – don't take in the middle of the night or you will wake feeling hung-over.
- Nytol (herbal) – also has some herbs!

If there is no improvement with a combination of the above, or if there are intolerable side effects, then I would go on to a prescribed drug. I usually start with one of the sedating antidepressants such as:

- Amitriptyline 10mgs - 25mgs. I would start with 5mg initially. Most CFS patients are made worse and feel hung-over with "normal doses". (Amitriptyline 10mgs 28 @ £1.15 ; Amitriptyline 25mgs 28 @ £1.15). OR
- Dothiepin - I do not prescribe dothiepin now because a study suggested that this had an increased risk of cardiac dysrhythmias compared to other tricyclic antidepressants.
- Surmontil 10-30mgs at night. Surmontil 10mgs 84 @ £17.04, Surmontil 25mgs 84 @ £23.03
- Short acting temazepam 10mgs. This is useful but recently has been made a controlled drug so doctors are understandably twitchy about prescribing it. It is controlled because some drug addicts were taking the gel and injecting it into themselves. Nowadays I tend to use instead zaleplon (Sonata) or medium acting zopiclone (Zimovane) 7.5mg.
- Diazepam is helpful if sleep is disturbed either because of hyperventilation (it reduces the respiratory drive) or for muscle spasms (it is a good muscle relaxant).

Different people will respond to different combinations of hypnotics. For example, one person may take a melatonin and two valerian at night, plus a zaleplon when they wake at 3.00am. Somebody else may be best suited by 10 mg amitriptyline at night with a Nytol. Don't be afraid to try combinations - there are no serious side effects that I am aware of with any of these used in combination. However, don't change more than one thing at any time otherwise you (and I) will get confused!

I like to supply a "starter pack" to my patients – this contains melatonin, valerian and Nytol – and try the various combinations.

One of my patients has found Sea Band (Isocones) very helpful – this uses an acupuncture technique by applying a wrist band – this is available from Boots. See www.sea-band.com.

My standard herbal “starter pack” consists of :

- Nytol (herbal) one a night 8 tablets
- melatonin 3 mgs 20 tablets
- Valerian complex 30 tablets

If you find your dose of hypnotic is gradually creeping up, then this may be because you have become less disciplined about establishing the conditioned reflex. Go back to the basics as above.

The deal is that every time you take a tablet for sleep you must work hard on the self hypnosis methods in order to condition yourself to sleep! We all are given the gift of sleep as babies, then unlearn it! It is perfectly possible to relearn sleep!

When your normal sleep pattern has been restored you can begin to reduce or tail off completely your hypnotic medication but only if good quality sleep can be maintained. Use the hypnosis “sleep dream” techniques every time you try to go to sleep, even when your sleep is disturbed by the need to pee – eventually your brain will learn! If your sleep begins to suffer, you must go back on the medication that worked before because the need to sleep is of paramount importance in CFS patients. Every time you have a bad night you “unlearn” how to sleep. It is vital to keep working on the sleep dream every time you go to sleep.

Other causes of poor sleep: Get the right hormonal balance

High levels of DHEA mean low levels of melatonin. Check this with an ADRENAL STRESS PROFILE.

HYPOTHYROIDISM can certainly present with insomnia

HYPERVENTILATION

HYPOGLYCAEMIA is the main cause

MENOPAUSAL SWEATING – I am increasingly coming to the view that this is a symptom of low blood sugar – see HYPOGLYCAEMIA.

Diet - the fuel in the tank!

Our gut evolved in harmony with the environment

Human beings evolved over millions of years eating particular foods. Neanderthal man was a carnivore and only ever ate meat, fish and shell fish. More recently Paleolithic man expanded the diet to include root vegetables, fruits, nuts and seeds which he could scavenge from the wild. It is only in the last few thousand years since the Persians, Egyptians and Romans that we began farming, and grains and dairy products were introduced into the human diet. A few thousand years from an evolutionary point of view is almost negligible. Many people have simply failed to adapt to cope with grains and dairy products and it is very likely that these foods cause a range of health problems in susceptible people.

Modern studies on ancient tribes who continue to eat a Stone Age (paleolithic) diet show that these people do not suffer from diabetes, obesity, heart disease or cancer. If they can survive the ravages of infectious diseases, childbirth and war wounds, then these people live healthily to a great age.

I am coming to the view that whatever your medical problem may be, or even if you simply want to stay well, we should all move towards eating a Stone Age diet based on vegetables, nuts, seeds, meat, fish and eggs. Recent Western diets get 70% of their calories from wheat, dairy products, sugar and potato and it is no surprise that these are the major causes of modern ill health such as cancer, heart disease, diabetes, obesity and degenerative disorders.

The principles and the practice of the Stone Age diet

There are five aspects of modern Western diet and gut function which commonly cause symptoms from irritable bowel syndrome to fatigue. These are:

1. High carbohydrate intake - this is probably the largest single cause of modern diseases such as hypertension, obesity, syndrome X, heart disease and cancer
2. Food allergy
3. Toxins in the diet (lectins naturally present in foods; artificial additives, colourings, flavourings; artificial sweeteners; pesticide residues, plasticiser residues, etc) social chemicals (alcohol, caffeine, tobacco etc), toxins from burnt fats in cooking.
4. Fermentation of food instead of digestion – see FERMENTATION IN GUT
5. Poor digestion of food due to low stomach acid (HYPOCHLORHYDRIA) and poor pancreatic enzyme production PANCREATIC FUNCTION.

The Stone Age diet tries to address the top three problems at the same time, since they often co-exist in the same patient. This is the diet I like all my patients (including me) to eat long term. This is because it is the evolutionarily correct diet and by eating this we can avoid long term health problems and postpone degenerative conditions. I would settle for getting my Parkinson's disease when I am 120!

As a general principle it is important to remember that:

Carbohydrates (CHO) tend to cause fatigue, even in "normal" people. We should be eating protein and fat in the day and saving carbohydrate until the evening, when it helps sleep. At present Western diets are completely upside down because we eat cereals and toast at breakfast, sandwiches at lunch and meat in the evening - it makes you feel tired in the day and wakes you up at night!

Food allergy is a common cause of many symptoms such as irritable bowel, asthma, mood swings, headache, arthritis, allergic muscles and of course fatigue. The commonest offenders are grains, dairy, yeast and toxins in the diet.

Chemicals in the diet inhibit enzyme systems and slow up metabolism - this applies to drugs as well as food additives and pesticide residues, hormone residues, antibiotic residues etc.. Inshore seafood can be expected to have a mercury load. Avoid additives, colourings, flavourings etc, avoid plastic wrappings (especially if heated!) on food and try to switch to organic foods wherever possible.

Gut dysbiosis and **poor digestion** of foods, whereby foods are fermented instead of being digested, can also cause these symptoms.

This diet, therefore, has foods of low glycaemic index (GI) in the day and moderate GI index in the evening, it avoids the common allergens, avoids mouldy foods and foods of high fermentable substrate and is as free from chemicals as possible. Actually, in the long term I see this as a diet for life. My view is that we should be mimicking Stone Age principles. The following is the evolutionarily correct diet. Once the diet is established, we do not have to follow it slavishly, but it should make up our staple diet and ultimately the forbidden foods should become treat foods and not staple foods.

Allowed foods in the Stone Age Diet

The following foods are allowed both in the day and the evening

Any **meats**: choose from chicken, beef, lamb, pork, turkey, duck, 'game' meats such as venison, pheasant, goose etc. Bacon and ham. Salami. Liver, kidney and offal are fine too.

Eggs - an excellent source of lecithin (eat soft yolks).

Any **fish**: salmon, mackerel, cod, haddock (care with smoked fish which often contains dyes). Tinned fish in brine or olive oil is fine. Tinned shrimps, prawns, mussels, cockles etc.

All **green vegetables**.

All **salads**: avocado, lettuce, tomato, cucumber, celery, peppers, onion, cress, bamboo shoots etc.

French dressing: make your own from olive oil, lemon juice, garlic, mustard.

Any **low CHO fruit**: apple, pear, orange, grapefruit (no sugar!). Berries are excellent.

Seeds: sunflower, poppy, sesame.

Nuts: peanut, brazil, hazel, cashew, pistachio, walnut etc.; nut butter spreads, tahini (sesame seed spread).

Use **cold pressed nut and seed oils** liberally such as sunflower, olive, sesame, grapeseed, hemp, linseed, rape and so on.

Soya products

Oats and oatcakes (do not eat for breakfast as it is likely to create CHO craving)

Spices and herbs: chilli, cumin, ginger, coriander, pepper, cloves etc

Herbs, salt (ideally Solo - a sodium reduced sea salt), olives, pork scratchings

Allowed drinks in the day

Bottled or filtered water

Herbal teas: redbush ("rooibosch", "11 O'clock tea"), rosehip tea.

In the evening you can eat all of the above, plus modest amounts of higher GI foods

Rice and potato e.g. rice cakes or puffed rice from health food shops.

Root vegetables - carrots, parsnip, turnip, celeriac

Specific grains: millet, buckwheat, sago, quinoa.

Some high carbohydrate fruit: banana, grapes, melon

Dried fruit: sultana, apricot, prune, raisin, fig, date etc

Pulses: lentil, butter beans, chick peas, flageolets etc

Mixture of nuts, seeds, dried fruits

Arrowroot flour: for thickening gravies

Diluted fruit juice: Grape juice, pineapple juice, apple juice, tomato juice.

Most foods from packets and tins will have **hidden additives**, so avoid these. Be careful with sausage which contains rusk. **ALL OTHER FOODS ARE FORBIDDEN!!!** - this means no tap water, tea, coffee, chocolate, alcohol, wheat (bread, biscuit, cake, pasta, pastry), rye (Ryvita), corn, dairy products (milk, butter, cheese, yoghurt, dried milk), vinegar and sugar. Try to avoid drugs and medicines, many of which contain fillers of corn, lactose, colourings etc.

Getting worse on the diet

This is almost to be expected. The reasons for worsening are as follows:

- Hypoglycaemia - this is the commonest reason for worsening and may take weeks to settle. There are some nutritional interventions which help greatly (see HYPOGLYCAEMIA - Not just about diet!)
- Caffeine withdrawal - again a common problem. Usually results in headache, which clears in four days.
- Food allergy withdrawal may cause many different symptoms. Some people report feeling 'flu like. Typically this lasts four days, but symptoms like eczema, arthritis, allergic muscles and fatigue can take weeks to clear. One patient with prostatism took 4 months to clear!

Meal suggestions

Breakfast

Bacon, eggs, fried tomato.

Smoked fish (kippers, mackerel with lemon juice).

Nuts and seeds with soya yoghurt (see Probiotics - we should all be taking these all the time and double the dose following antibiotics and gastroenteritis)

Lunch

Cold meat, fish (tinned fish in olive oil is fine), prawns, salami, smoked fish, rusk free sausage (ie 100% meat), avocado.

Salad (lettuce, cucumber, tomato, celery, peppers etc), French dressing.

Green vegetables with nut/seed oils

Home-made soup (made from meat stock, not cubes, only with allowed vegetables).

Nuts and seeds with soya yoghurt

Oatcakes

Supper

Meat, fish or eggs, potato or rice, any vegetable.

Fruit, soya yoghurt.

Muesli made from rice flakes, millet flakes, nuts, seeds, dried fruit, fresh fruit etc (some health food shops do "gluten free" muesli with the above ingredients). Use soya milk or fruit juice to wet the dry cereal. Puffed rice or rice cakes with soya margarine, nut butter. Oatcakes.

Buckwheat flakes.

Always remember: breakfast like an emperor, lunch like a king and supper like a pauper!

In practice, make the Stone Age diet your staple diet, but relax the rules when you socialise.

What to do if you are no better on the diet

Stick with it! This is the evolutionarily correct diet and greatly reduces your risk of heart disease, cancer and degenerative conditions! The three common reasons for not improving are:

- Because of multiple allergies to foods (i.e. there is something on the diet that you continue to react to). In this case consider a rotation diet, or starting on desensitisation ENZYME POTENTIATED DESENSITISATION - INTRODUCTION
- Because of a gut dysbiosis - i.e. the wrong bugs in the gut. Consider a gut fermentation test or Comprehensive Digestive Stool analysis to look for parasites, bacterial overgrowth or yeast overgrowth. FERMENTATION IN THE GUT AND CFS.
- Poor digestion of foods HYPOCHLORHYDRIA, PANCREATIC FUNCTION
- Because you trigger a detox reaction.

Recommended reading:

- "The Complete Guide to Food Allergy and Intolerance" Brostoff and Gamlin, £9.99.
- "Not All In The Mind" - Richard Mackarness
- "The Food Intolerance Diet Book" Workman, Hunter and Alun Jones.
- "Dr Atkins Diet Revolution" - Dr Robert C Atkins.
- "The Detox Diet" - Dr Paula Baillie-Hamilton 0-718-14545-3 from www.penguin.com

If you wish also to lose weight

As a general principle I don't like my CFS patients dieting because cutting calories makes you tired, cold and depressed and you can do without those things! However, if you are extremely strict with CHO, the body switches into a state of ketosis. To burn fats in the body is a two stage process - the first stage is conversion of fats to ketones, the next is ketones to carbon dioxide and water. Both stages release energy for the body to use. However, the second stage requires some CHO - if there is none then ketones are excreted in the breath and in the urine - one literally pees out calories. This is very good for morale when every time you pee you lose calories and weight! To do this diet properly you really need to get the book "Dr Atkins Diet Revolution", which goes into detail of exactly which foods you need. Also I can supply ketostix which measure ketones in the urine and tell you if you are doing the diet correctly. Atkins permits dairy products but I recommend avoiding these. He also permits various artificial sweeteners which should be avoided. I recommend the use of Stevia, an extract of a South American plant.

Also see BEING OVERWEIGHT – LOSING IT!

Rotation Diets

The idea behind a rotation diet is that one continues to react to foods that are in the gut for possibly up to three days. So no food is eaten within that time. Day 1 has a group of foods you are allowed to eat, then a completely different group of foods for days 2, 3 and 4 before repeating the cycle. You can find an example of a 4 day rotation diet on the website (it could be worse – there are 7 day rotation diets! If it's Wednesday it must be parsnip!!!). Or phone the office for a hard copy. Obviously avoid any foods which you know you are allergic to.

Very Restricted Diets eg lamb, pear and rice

I used to give patients very restricted diets (such as lamb, pears and rice) to sort out their allergies. I no longer do this for two reasons. Firstly I found a few patients got stuck on a very restricted diet and were unable to expand it. However I do occasionally do a rare foods diet for a limited period of time – say two weeks. Secondly I now have a technique called EPD (ENZYME POTENTIATED DESENSITISATION) which turns off food allergies without one having to know what those allergies are. It can do this because all the different food antigens are represented in the vaccine. I use EPD if I am convinced that a patient has food allergies but is not responding to the elimination or rotation diets.

The supermarkets are now catching on to the demand for grain free, dairy free and yeast free products and there is a much better choice of foods than ever before.



The Problem of Addiction

These days I find myself talking more about addiction than allergy and there is no doubt carbohydrate addiction is a major cause of tiredness. It results in hypoglycaemia and maybe you can identify with the following scenario.

I estimate that over 90% of people who consult me are addicts. Addiction usually starts off in life with sugar, but then moves onto carbohydrates generally, chocolate, caffeine, nicotine, alcohol and maybe onto other hard drugs. There is a carbohydrate addiction gene which switches on when the carbohydrate content of the diet exceeds 4%. This makes one endlessly crave carbohydrates when carbohydrates are available. This does not make sense until you think from an evolutionary point of view. Protein foods such as meat, fish and shellfish, were available throughout the year, but every so often there would be a bonanza when, for example, the banana tree would ripen. The only way man could store this food source was to eat it and store it as body fat. So once carbohydrate appeared in abundance and he started to eat it the carbohydrate gene was switched on to create a craving Homo Sapiens who ate to excess, put on weight and was thereby able to store it in his body for leaner times ahead. The problem in modern times is that carbohydrates are now freely available and we continue to crave them and continue to put on weight. Furthermore, once you put on weight, the imperative to use your brain and your body to seek new food declines and so you become sluggish and lethargic. The converse of this is true. If you wish to lose weight then eat a very low carbohydrate diet such as the Atkin's diet and often you will see an immediate improvement in your mental and physical energy levels.

The reason we become addicted is because consuming the addictive foods has a direct effect on brain neurotransmitters causing the release of happy hormones such as serotonin, adrenaline, noradrenaline, endogenous opiates and possibly others. These have the combined effect of giving energy (both physical and mental) as well as a calming effect (everybody recognizes comfort foods – or reward foods). These are highly desirable in the short term, but you can't have an upper without a downer, and soon, levels of happy hormone start to decline. We recognise the symptoms, start to crave again and go for another shot of addiction. Sometimes we vary the addiction and switch from one addiction to another.

In the long-term chronic addictions lead to chronic fatigue!



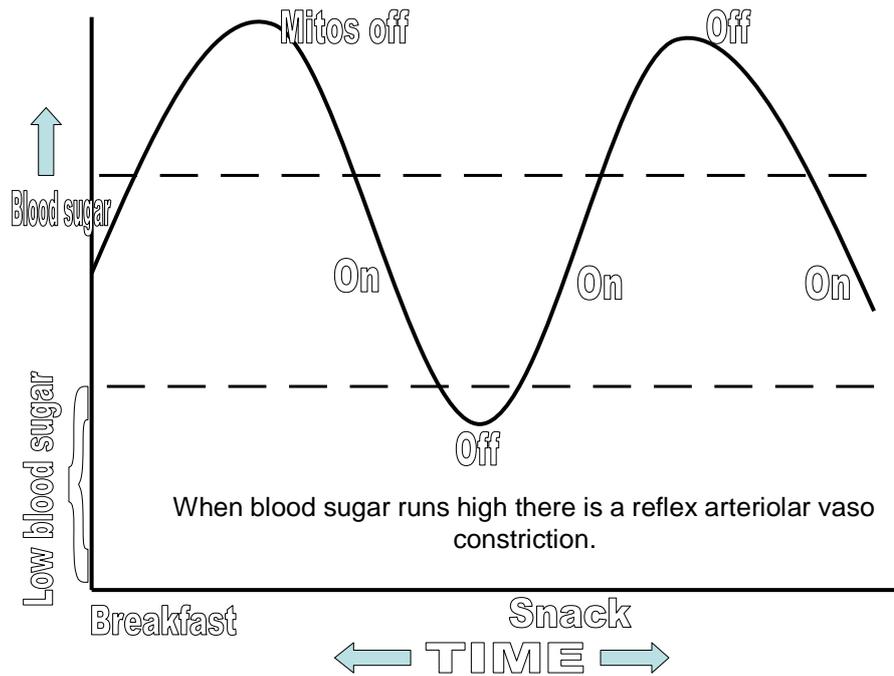
Hypoglycaemia – symptoms, test, treatment

It is critically important for the body to maintain blood sugar levels within a narrow range. If the blood sugar level falls too low, energy supply to all tissues, particularly the brain, is impaired. However if blood sugar levels rise too high this is very damaging to arteries and the long term effect of arterial disease is heart disease and strokes – this is probably caused by a local reaction in peri-arteriolar fat resulting in release of pro-inflammatory cytokines causing damage to arteries.

Normally the liver controls blood sugar levels. It makes the sugar from energy stores inside the liver and releases sugar into the blood stream minute by minute in a carefully regulated way to cope with body demands, which may fluctuate from minute to minute. This system of control works perfectly well until we upset it by eating the wrong thing. Eating excessive sugar at one meal, or excessive refined carbohydrate, which is rapidly digested into sugar can suddenly overwhelm the liver's normal control of blood sugar levels.

We evolved over millions of years eating a diet that was very low in sugar and had no refined carbohydrate. Control of blood sugar therefore largely occurred as a result of eating this Stone Age diet and the fact that we were exercising vigorously, so any excessive sugar in the blood was quickly burned off. Nowadays the situation is different - we eat large amounts of sugar and refined carbohydrate and do not exercise enough in order to burn off this excessive sugar. The body therefore has to cope with this excessive sugar load by other mechanisms.

When food is digested, the sugars and other digestive products go straight from the gut in the portal veins to the liver, where they should all be mopped up by the liver and processed accordingly. Excessive sugar or refined carbohydrate overwhelms the liver, which simply cannot mop up the amount of sugar which is there and the sugar spills over into the systemic circulation. This results in high blood sugar, which is extremely damaging to arteries. If one were exercising hard, this would be quickly burned off. However, if one is not, then other mechanisms of control are brought into play. The key player here is insulin, a hormone excreted by the pancreas. This is very good at bringing blood sugar levels down and it does so by shunting the sugar into fat. There is then a rebound effect and blood sugars may well go too low. Low blood sugar is also dangerous to the body because the energy supplied to all tissues is impaired. It is when the blood sugar is low that this is called hypoglycaemia. Subconsciously people quickly work out that eating more sugar alleviates these symptoms, but of course they invariably overdo things, the blood sugar level then goes high and one ends up on a rollercoaster ride of blood sugar going up and down throughout the day.



Symptoms of hypoglycaemia

The problem is that when the blood sugar is high people feel “normal”, indeed maybe slightly boosted by this high level of blood sugar. This is because they have good energy supply to their muscles and brain albeit short-term. The problem arises when blood sugar levels dive as a result of insulin being released and energy supply to the brain and the body is suddenly impaired. This results in a whole host of symptoms - the brain symptoms include difficulty thinking clearly, feeling spaced out and dizzy, poor word finding ability, foggy brain and sometimes even blurred vision or tinnitus. The body symptoms include suddenly feeling very weak and lethargic, feeling faint and slightly shaky, rumbling tummy and a craving for sweet things. The sufferer may look as if they are about to faint (and indeed often do) and have to sit down and rest. The symptoms can be quickly alleviated by eating something sweet - if nothing is done then the sufferer gradually recovers. These symptoms of hypoglycaemia can be brought upon by missing a meal (or one’s usual sweet snack top up such as a sweet drink), by vigorous exercise or by alcohol. Diabetics may become hypoglycaemic if they use too much medication.

When blood glucose levels fall for any reason, glycogen stores in the liver may be mobilised to prop them up. The trouble is that these are probably already rather poor in people with increased carbohydrate intake, where insulin is relied on heavily. Another rapid and very effective way in which the body repletes the low glucose is by hepatic conversion of short chain fatty acids to glucose. In a healthy person on a good balanced diet the only time this is of importance is during the night because of the long break between food intake. Short chain fatty acids are then used to prop up circulating glucose and prevent a fall below whatever that person’s usual fasting glucose level is. Short chain fatty acids are made in the gut by bacteria fermenting fibre (and such starch as escapes small intestinal digestion). Production is maximised from about 3 hours after food intake. That is to say, short chain fatty acids are highly protective against the dips we see in blood sugar.

Therefore, a key symptom of a hypoglycaemic tendency is disturbed sleep. This occurs typically at 2 – 3 am, when blood sugar levels fall and there are insufficient short chain fatty acids to maintain a blood sugar. Low blood sugar is potentially serious to the brain, which can only survive on sugar and, therefore, there is an adrenalin reaction to bring the blood sugar back, but this wakes the sleeper up at the same time.

Common symptoms of hypoglycaemia

SOURCE www.hypoglycaemia.asn.au

- *Nervousness*
- *Irritability*
- *Exhaustion*
- *Faintness*
- *Dizziness, feeling “spaced out” or faint*
- *Tremors or feeling “shaky”*
- *Cold sweats*
- *Depression*
- *Migraine headaches*
- *Insomnia*
- *Digestive disturbances*
- *Forgetfulness*
- *Mood swings*
- *Anxiety*
- *Aggression*
- *Violence*
- *Anti-social behaviour*
- *Sugar addiction*
- *Epilepsy and Convulsions*
- *Drug addiction and alcoholism*
- *Mental confusion*
- *Limited attention span*
- *Learning disability*
- *Lack of sex drive in women and men*
- *Lack of concentration*
- *Itching and crawling sensation on the skin*
- *Blurred vision*
- *Nightmares*
- *Phobias*
- *Fears*
- *Neurodermatitis*
- *Nervous breakdown*
- *“Foggy” brain (such as in chronic fatigue syndrome)*
- *Blurred vision*
- *Tinnitus (ringing in the ear) Suddenly feeling weak or lethargic*
- *Bedwetting and Hyperactivity (ADHD or ADD) in children*

Test for hypoglycaemia

Measuring blood sugar levels is not a terribly useful test for hypoglycaemia, partly because they fluctuate so much and partly because by the time one gets the symptoms of hypoglycaemia, the blood sugar levels have started to correct. A much better test would be to measure short chain fatty acids in blood collected in the morning before breakfast. The test should be done as follow:

- It is important to continue your usual diet – indeed, there are no special dietary instructions for the test, but the blood sample must be taken between 9 –12 hours after a meal;
- 2 ml of blood taken into a fluoride oxalate tube and posted off in an envelope to Acumen.

There is a final twist to the hypoglycaemic tale which complicates the situation further. When one becomes stressed for whatever reason, one releases stress hormones in order to allow one to cope with that stress. Insulin is such a stress hormone and has the effect of shunting sugar in the blood stream into cells. This produces a drop in blood sugar levels and also causes hypoglycaemia. Therefore, hypoglycaemia can be both a cause of stress and the result of stress, indeed, another one of those vicious cycles that are so often seen in disease states.

Treatment of Hypoglycaemia

Treatment is to avoid all foods containing sugar and refined carbohydrate and take extra supplements – see below. The problem for the established hypoglycaemic is that it may take many weeks or indeed months for the liver to regain full control of blood sugar and therefore the symptoms of hypoglycaemia may persist for some time whilst the sufferer continues to avoid sugar and refined carbohydrate. This means that when you change your diet you will get withdrawal symptoms and it may take many weeks of a correct diet before these symptoms resolve. This type of addiction is very much like that which the smoker or the heavy drinker suffers from.

One needs to switch to a diet which concentrates on eating proteins, fats and complex (and therefore slowly digested) carbohydrates. Initially I suggest doing a high protein high fat diet, but include all vegetables (care with potato), nuts, seeds, etc. Fruit is permitted but rationed, since excessive amount of fruit juices or dried fruits contain too much fruit sugar for the liver to be able to deal with. I suggest one piece of fruit at mealtimes.

I now consider taking high dose probiotics an essential part of controlling low blood sugar. This is because probiotics ferment carbohydrates to short chain fatty acids – these have no effect on blood sugar and are the preferred fuel of mitochondria. The best and cheapest way to do this is to brew your own – see section on PROBIOTICS and KEFIR! Probiotics also displace yeast, which worsen the hypoglycaemia problem.

With time the regime can be relaxed, but a return to excessive sugar and refined carbohydrate means the problem starts again.

Finally, many sufferers of hypoglycaemia may need something sweet to eat immediately before and during exercise, until the body learns to fully adapt.

Hypoglycaemia is usually accompanied by micronutrient deficiencies. You should also take nutritional supplements. My experience is that chronic hypoglycaemia is a very common cause of fatigue in CFS sufferers.

To tackle hypoglycaemia one needs to do a diet based on foods of low glycaemic index. The GI is a measure of the ability of foods to raise one's blood sugar levels. Sugar (ie disaccharides) have arbitrarily been given a GI of 100. High GI foods are the grains (wheat, rye, oats rice etc), root vegetables (potato, sweet potato, yam, parsnip), alcohol, sugars, and fruits, dried fruits and fruit juices. But expect to see withdrawal symptoms which can persist for weeks.

Hypoglycaemia is not just about diet!

Low blood sugar is an extremely common problem and I find myself talking about this subject more than any other! The body has a very difficult balancing act with respect to blood sugar. If levels drop too low, then this will cause unconsciousness and then death. On the other hand, if the blood sugar level goes too high, glucose will stick onto many other substances to create advanced glycation end products. This effectively causes an accelerated ageing. So the body goes to a great deal of trouble to keep the blood sugar tightly controlled between about 3mmols and 6mmols per litre. The mechanisms that achieve this are complicated and therefore there is great potential for things to go wrong.

This is complicated by the fact that the brain likes sugar. Running a high blood sugar allows the brain to function efficiently and also releases the happy neuro-transmitters such as GABA and

serotonin which have a calming effect. We all recognise this because the comfort-eating foods are carbohydrates. The second problem is that we have a “thermostat” for blood sugar (this is, if you like, a measure against which blood sugar levels are compared and controlled), which I suspect gets set upwards if blood sugars run consistently high. I believe this because I’ve seen several people with diabetes who run consistently high blood sugar levels but feel hypo if their blood sugars drop below 7 or 8. So whatever interventions one makes to control high blood sugars must be done slowly so that this “thermostat” can be gradually reset.

What makes blood sugar go up?

“Diet” is the most obvious answer! Carbohydrates are broken down into sugars which increase the blood sugar levels. Foods have been given a measure of this and it is called the “glycaemic index”. It’s a measure of the ability of a food to raise blood sugar levels. This can be affected by many factors, not just the food itself. Foods that are cooked will be more rapidly digested and therefore have a higher glycaemic index. Foods that are finely divided such as flours, again are more rapidly digested and therefore have a high glycaemic index. Carbohydrates that are very soluble such as sugars and alcohol again are rapidly absorbed. Any carbohydrates that are consumed should therefore be unrefined complex carbohydrates which are slowly digested, if possible eaten raw (although this is obviously impossible with some carbohydrates such as potato).

Foods should be slowly eaten. What causes insulin to be released is the rate at which the blood sugar level rises. A quick rise will produce a pulse of insulin which then hangs around for a long time and causes subsequent hypoglycaemia. So eat foods slowly, don’t gobble them, and mix carbohydrates with high fibre foods, vegetables, meat and fats so that the absorption of carbohydrate is slowed.

It is easy to identify the carbohydrate addicts – they like their carbohydrates highly refined such as sugar, sweets, crisps, white bread, pasta and refined breakfast cereals and fruit juice. They tend to gobble their food. They are not content with a normal meal of meat and vegetables without the sweet sticky pudding to follow!

Alcohol – the commonest symptom of alcohol causing hypoglycaemia is sleeplessness. Initially alcohol helps one to go to sleep, but then it wakes one up in the small hours with rebound hypoglycaemia.

Which other factors affect blood sugar levels?

Stress

One of the stress hormones is insulin. This is because insulin drives sugar in the blood inside cells so it can be ready for immediate use. This means blood sugar levels will fall resulting in hypoglycaemia.

Poor digestion of foods

If proteins are not completely broken down into amino acids this may result in long chain polypeptides getting from the gut into the blood stream where they can have insulin-mimicking effects. This can be tested for by requesting *Short chain polypeptides*. Also see HYPOCHLORHYDRIA, EXOCRINE PANCREATIC FUNCTION and MALABSORPTION.

Probiotics

Having the right bugs in the gut means that fibre in the diet can be broken down into short chain fatty acids such as acetates, butyrates and propionates. When blood sugar levels run low, the body switches to short chain fatty acids for fuel. It is this which protects us from hypoglycaemia between meals especially where there is a long gap, for example at night. We can test for short chain fatty acids by measuring levels of acetate, propionate and butyrate in the blood first thing in the morning before breakfast. Low levels suggest a tendency to hypoglycaemia. See PROBIOTICS and KEFIR

Candida and yeast problems

A yeast overgrowth in the gut means that any sugars, or carbohydrates which get digested to sugars, are then fermented by yeast. This produces carbon dioxide (and so bloating) together with alcohol. Alcohol is a high GI food, further destabilises blood sugar so rebound hypoglycaemia occurs. This makes the sufferer crave carbohydrate – a clever evolutionary ploy by candida to make the host eat the very food the yeast wants most! See YEAST PROBLEMS.

Good micronutrient status

Vitamins, minerals, essential fatty acids, vitamin C and D are all involved in blood sugar control. Two which seem to be particularly helpful are high dose niacinamide and chromium. I recommend taking them for two months. Both these supplements have a profound effect on blood sugar levels to stabilise them but sometimes have to be given in high doses initially to kick start the necessary mechanisms. By this I mean niacinamide 500mgs, 3 daily at mealtimes and possibly double this dose. Rarely, niacinamide in these doses can upset liver enzymes but this is accompanied by nausea – so if you feel this symptom, reduce the dose to 500mgs daily. Niacinamide is a really interesting vitamin – it shares the same action as diazepam (Valium) to produce a calming effect which is not addictive. I suspect it works because so much anxiety is caused by low blood sugar and niacinamide helps prevent this.

I also suggest 2mgs of chromium daily. The usual daily requirement would be a tenth of this but with severe hypoglycaemia there is often severe chromium deficiency. Niacinamide and chromium work together synergistically.

Allergies to Foods - this can certainly cause hypoglycaemia – the top three allergens are grains, dairy products and yeast. But one can be allergic to any food! See STONEAGE DIET.

Hormonal Effects

Thyroid – or hypothyroidism - Can certainly cause hypoglycaemia. See HYPOTHYROIDISM

Adrenal Problems and Cortisol

The job of the adrenal gland is to produce the stress hormones to allow us to move up a gear when the stress comes on. Cortisol raises blood sugar levels. It is largely excreted during mornings and declines as the day progresses - this is why we should feel at our best early in the day, and blood sugar problems get worse as the day progresses. Often people compensate for this by eating more as the day goes on and explains why many hypoglycaemics do not need or eat breakfast with supper being the largest meal of the day. Changing all of the above will help. But it may be appropriate to do an adrenal stress profile and actually measure output of the stress hormones cortisol and DHEA since a small supplement may be very helpful. See ADRENAL PROBLEMS.

Sex hormones, The Pill and HRT

These hormones all have the effect of raising blood sugar levels. Indeed this is the mechanism which is responsible for gestational (pregnancy) diabetes. The problem is that stopping these hormones then causes hypoglycaemia and one gets withdrawal symptoms. I suspect it is part of the mechanism that makes these hormones so addictive. See PILL AND HRT.

Toxins and Pollutants

There was a fascinating paper in the Lancet that showed that the biggest risk factor for diabetes (and this is the end product of years of hypoglycaemia as insulin resistance results) is the level of pollutants in the body (pesticides, volatile organic compounds and heavy metals). The paper showed that chemical pollutants were a greater risk factor than being overweight! It was suggested that the overweight problem reflected a larger chemical burden as the body tried to “dump” chemicals where they would be out of the way. When people who have the highest levels of POPs in the blood were compared to the people with the lowest levels of POPs in the blood, they were found to be 38 times more likely to be diabetic.

The chemicals literally get in the way of many biochemical processes and prevent the body functioning normally. So for some people doing detox regimes is very helpful – ie far infra red sweating/saunaing and improving liver detox with vitamins and minerals. We can easily test for pollutants in fat by doing a fat biopsy – this is a simple test, easier than a blood test! See DETOXIFICATION.

Nickel toxicity

Nickel toxicity is a very common problem and nickel is a substance often found stuck onto DNA (See *DNA ADDUCTS*). Nickel biochemically looks very much like zinc and so enzymes which normally incorporate zinc into them, in the presence of zinc deficiency, will take up nickel instead. This prevents the enzyme or the hormone from functioning normally. Clinically nickel toxicity often presents with hypoglycaemia. (See NICKEL).

Fructose intolerance

Fructose is fruit sugar generally perceived to be a healthy alternative to glucose. No problem if one is tolerant of fructose or if it is taken in small amounts, but problems in either of these departments can result in hypoglycaemia. This is because the control mechanisms that apply to glucose are bypassed if the system is awash with fructose. In fructose intolerance (aldolase type B deficiency), fructose-1-phosphate builds up because it inhibits glycogen phosphorylase which is essential for the provision of glucose from glycogen and it also inhibits fructose-16-biphosphatase which is essential for provision of glucose from protein and fat. This combination can result in severe hypoglycaemia because it means effectively the body cannot mobilise glucose from stores in the liver for when blood sugar levels fall. This combination can lead to severe hypoglycaemia.

Even if the enzyme works perfectly well, excessive fructose intake will stress the same pathways. Sugar stores in the liver cannot be mobilised. Because the liver uses up short chain fatty acids for the production of glucose to try to avoid this hypoglycaemia, this tendency can be measured by looking at short chain fatty acids in the blood and also measuring levels of fructose-6-phosphate which gets induced in this situation. These three metabolic problems i.e. levels of short chain fatty acids, levels of fructose-6-phosphate and LDH isoenzyme (indicative of liver damage), can help diagnose this problem. The cost to do each individual test is £52 for fructose-6-phosphate, £45 for short chain fatty acids and £90 for LDH isoenzymes. However, if you order all three together the cost is £165 and you get a *cell-free DNA* free of charge.

GI rating for some common carbohydrates

A Glycaemic Index of less than 55 is considered Low, 56 to 69 Medium and greater than 70 is High. Values will vary depending on brand, variety, ripeness, preparation etc.

All Bran 43	Ice cream 61	Potato (boiled or mashed) 74
Apple 37	Jelly beans 80	Potato (jacket baked) 72
Apple juice (clear) 44	Kidney beans 28	Potato crisps 54
Apricot (dried) 30	Kiwi fruit 53	Potato: new 62
Apricot (jam) 55	Lentils 28	Puffed Wheat 80
Apricot (tinned) 64	Mango 56	Raisins 64
Baked beans (tinned) 46	Mars bar 65	Rice Crispies 83
Banana (ripe) 58	Milk (full fat) 27	Rich Tea biscuits 57
Banana (unripe) 30	Milk (skimmed) 32	Rye bread 65
Beetroot 64	Mixed grain 49	Shredded Wheat 70
Butter beans 31	Muesli 58	Sourdough 57
Carrots 51	Oat bran 50	Soya beans 20
Cashews 22	Orange 44	Spaghetti (white) 43
Cherries 22	Orange juice 55	Spaghetti (wholemeal) 39
Chickpeas 33	Parsnips 68	Special K 54
Chocolate 49	Pineapple 66	Split peas 32
Cornflakes 81	Peach 42	Strawberry 32
Croissant 69	Peanut butter 29	Sultanas 57
Dark rye bread 76	Peanuts 22	Swede 72
Dates (dried) 72	Pear 36	Sweet corn 55
Digestive biscuit 60	Peas 48	Sweet potato 54
Doughnut 76	Pineapple juice 46	Table sugar 65
French baguette 68	Pinto beans 40	Tomato juice 38
Fructose 46	Pitta bread 58	White bread 70
Glucose 100	Plums 32	Wholemeal bread 69
Grapefruit 25	Popcorn 55	Yoghurt (low-fat, sweetened) 33
Grapes 48	Porridge 46	Yoghurt (low-fat, unsweetened) 14
Hazelnuts 33		

Glycaemic Load

While GI is a very useful concept, it cannot be taken as the sole predictor of the effects of eating a particular type of carbohydrate. That is because blood glucose response is also determined by the amount of food eaten. A more reliable rating system is the 'glycaemic load' (GL), which takes account of both the quality (GI value) of a given carbohydrate and the amount consumed, so more accurately predicting its effects on blood sugar.

The glycaemic load, in units, of a portion of carbohydrate is expressed as:

- $\text{GI rating} \times \text{grams of carbohydrate in portion size} / 100$.

Note that each unit of GL produces the same effect on blood sugar as eating 1g of pure glucose.

- A 120g banana contains around 24g of carbohydrate, which has a GI value of 58.
The GL is: $(58 \times 24) / 100 = 13.92$ units.

- 120g of chocolate provides 75g of carbohydrate, which has a GI value of 49
The GL is: $(75 \times 49) / 100 = 36.75$ units.

By totalling up the GL units for foods you eat during the day, you can arrive at an overall GL for the day. A Glycaemic Load of Less than 80 units is considered Low, 80 to 120 units is Medium and greater than 120 units is High.

Finally glucomannan is helpful to stabilise blood sugar levels by reducing the blood sugar peak after food and preventing the rebound hypoglycaemia.

Why sugar and fast carbs are so bad for energy levels – a possible explanation

Yudkin et al explains all in the Lancet May 2005! Too much sugar in muscles is very damaging to muscles. The arterial control of the blood supply to muscles is by tiny collar of fat which wraps itself round tiny arteries (arterioles). If the blood sugar rises, this collar of fat releases a cytokine which makes the arteriole contract. This has the metabolically desirable effect of preventing too much sugar getting to muscle and damaging it. However, the blood supply to the muscle will be impaired as well, so the muscle cannot work properly. Also the cytokine released by the fat causes inflammation and damages the arteriole wall. This is also probably the basis of high blood pressure and arterial disease. And don't forget in CFS we see high levels of cytokines. The general presumption is that these come from immune activity as a result of viral or toxic stress. BUT they could be produced by fat cells as a result of too much carbohydrate in the diet!

Reference: Lancet 2005: 365:1817-20 "Vasocrine" signalling from perivascular fat: a mechanism linking insulin resistance to vascular disease.



Allergy

Allergy is the great mimic and can produce almost any symptom. However, by the time allergy has produced fatigue it has also caused other problems. Suspect an allergy problem if any, or a combination of the following, are present:

1. **The onset of fatigue is pre-dated by PIMS** (Psychological, Irritable bowel syndrome, Migraine and headaches). Allergies to foods which hitherto have produced either
 - a) mood swings, depression, PMT,
 - b) wind, gas, bloating, abdominal pain, alternating constipation and diarrhoea,
 - c) migraines or headaches; if undiagnosed and not avoided, often go on to produce fatigue.
2. **There are other obvious allergic disorders** (which often present in childhood) such as asthma, eczema, urticaria, rhinitis and catarrh, colic etc. which are often due to food allergies.
3. **There is a tendency to go for a particular food.** One of the interesting aspects of allergy is that sufferers often crave the very food to which they are allergic. This was illustrated by one patient who told me that when he died he wished to take a cow to heaven with him. It was dairy which was his main problem!
4. **Symptoms change with time.** Often the allergen is the same, but the symptom changes through life, starting with colic and projectile vomiting as a baby, followed by toddler

diarrhoea, catarrh and recurrent infections, growing pains, headaches, depression, irritable bowel syndrome, PMT, asthma, arthritis etc. and eventually fatigue.

5. **There is a positive family history.** So often it is not so much problems which run in families but answers to problems. I have yet to find a patient who is dairy allergic who does not have a first degree relative (parent, sibling, child) who also has symptoms caused by dairy products!

A book by Branahan, an America Immunologist, states that 50% of unexplained symptoms are caused by food allergy.

Tests for food allergy are notoriously unreliable and at the end of the day one has to do an elimination diet. I use a “Stoneage Diet” which cuts out the major allergens. It is a “best guess” diet and will not identify every allergic simply because some people are multiply intolerant. However, for those people I do not like them to do a more restricted diet because if they cut out too much they risk ending up eating nothing. These allergics I start on desensitisation sooner rather than later.



Probiotics

In November 2006 I attended an Allergy Research Foundation conference at the Royal College of Physicians where the subject “Probiotics as Mainstream Medicine” was discussed. The following is a resume of the clinically important aspects of what was said.

In a normal situation free from antiseptics, antibiotics, high-carbohydrate diets, hormones and other such accoutrements of modern western life, the gut flora is safe. Babies start life in mother’s womb with a sterile gut. During the process of birth, they become inoculated with bacteria from the birth canal. This inoculation is enhanced through breast-feeding because the first milk, namely colostrum, is highly desirable substrate for these bacteria to flourish. We now know that this is an essential part of immune programming. Indeed 80% of the immune system is gut associated. These essential probiotics programme the immune system so that they accept them and learn what is beneficial. A healthy gut flora therefore is highly protective against invasion of the gut by other strains of bacteria or viruses.

If we eat probiotics which have been artificially cultured, for a short while the levels of these probiotics in the gut do increase. However, as soon as we stop eating them, levels taper off and disappear. This means there is something different between those bacteria that are acquired from mother and those bacteria which are artificially introduced. It appears that for bacteria to be accepted into the normal gut and remain, they have to be programmed first through somebody else’s gut (in this case mother’s). We now know that these educated bacteria can be introduced into another person’s gut, where they remain even when the administration of these bacteria has ceased.

This therefore explains how it is that the gut flora is so important, but is so difficult to change, when things go wrong. To be effective we need to treat somebody with bacteria which have already passed through somebody else’s gut and are therefore educated and programmed to remain.

So, when it comes to repleting gut flora, there are two ways that we can go about this – either we can take probiotics very regularly (and the cheapest way to do this is to grow your own probiotics, see below) or to take bacteria which have already been programmed. Indeed, this latter technique is well established in the treatment of *Clostridium Difficile* (a normally fatal gastroenteritis in humans) and

interestingly in Idiopathic Diarrhoea in horses. In the latter case horses are inoculated with the bacteria from the gut of another horse. However, and quite understandably, there is an instinctive revulsion to the idea of coprophagia! Fortunately, we have two knights in shining armour coming to our rescue in the form of Gary Smith and Paul Jaep and I thoroughly recommend that you look at their website <http://www.yeast-candida-infections-uk.co.uk/>. They are in the process of trying to culture bacteria that have already been through a human's gut, remove the pathogens (if present) and turn them into a bio-available culture. At present, this is very much in the formative stages but watch this space!

What was clear from the day's conference is that the gut flora is extremely stable and difficult to change. Therefore if one is going to take probiotics, they have to be taken long term. The second important thing I learned is that many preparations on the market are ineffective. Those found to be most effective are those milk ferments and live yoghurts where the product is freshly made. It is not really surprising. Keeping bacteria alive is difficult and it is not surprising that they do not survive dehydration and storage at room temperature. So your best chance of eating live viable bacteria is to buy live yoghurts or drinks. These can be easily grown at home, just as one would make home made yoghurt. If you cannot grow easily from a culture, then it suggests that the culture is not active, so this is a good test of what is and is not viable. I have tried to culture on milk and soya from dried extracts with very poor success rates suggesting that the dried extracts are not terribly viable.

In the interim, the best you can do is grow your own probiotics since this is a cheap and effective way of sorting the situation out as follows:

The idea here is to take a substrate on which to grow the bugs and to which one is not allergic and make your own culture. This means one can swallow high dose probiotics, which are alive and kicking (so much better able to colonise the gut) and they can be eaten regularly throughout the day very cheaply and deliciously. It also means that on what ever you grow the culture, the sugar is fermented out of it and so this provides a good low glycaemic index food. This inhibits fermentation by yeasts. Furthermore, probiotics convert sugars and starches in the gut into short chain fatty acids, which are the preferred fuel for mitochondria. Therefore, anyone with a tendency to hypoglycaemia will find their symptoms greatly reduced. Even for normally healthy people probiotics will stabilise blood sugar levels and reduce risk of obesity, diabetes, Syndrome X, heart disease, PCOS, cancer and all those problems arising from a hypoglycaemic tendency. Indeed, this idea of using fermented foods is very popular in many human societies and is associated with long and good health!

The sort of problems I expect to see in people with abnormal gut flora result clinically from the fermentation of sugars and starches by yeasts, which form alcohol and wind. They are:

Gut symptoms - irritable bowel syndrome (alternating constipation or diarrhoea, wind gas, pain), stools like pellets, foul smelling offensive wind, indigestion, poor digestion, constipation;

Tendency to low blood sugar with carbohydrate craving;

Tendency to "candida" problems – such as thrush, skin yeast infections;

Tendency to develop allergies to foods;

Leaky gut (positive PEG test).

In theory any probiotics on the market can be used to start the culture going but in practice many of the dried preparations are inactive. You could try starting with plain live yoghurt, but the bacteria in yoghurt may be chosen for its ability to make tasty yoghurt rather than what is good for your gut! One of my patients swears by kefir. I can supply individual sachets of kefir if you have problems finding a source. Please, email your request to my dispensing team on judy@doctormyhill.co.uk or phone the office. I have been growing Kefir and it goes well at room temperature. I am dairy allergic so I use soya milk but it also grows on rice milk or coconut milk and who knows what else! Start off

with one litre of soya milk in a jug, add the Kefir sachet and within about 12-24 hours it has gone semi solid. Then keep in the fridge, where it ferments further. This slower fermentation seems to improve the texture and flavour. However, it can be used at once as a substitute in any situation where you would otherwise use cream or custard. Once the kefir is down to nearly the bottom, add another litre of soya milk, stir it in and away you go again. I don't even bother to wash up the jug – the slightly hard yellow bits on the edge I just stir in to restart the brew. This way a sachet of Kefir lasts for life! One idea I am playing with is the possibility of adding vitamins and minerals to the culture. The idea here is that they may be incorporated into the bacteria and thereby enhance the absorption of micronutrients. You could try this if you do not tolerate supplements well.

The use of probiotics is already established practice in animal welfare and probiotics are actively marketed to the horse industry for this very reason. They are routinely used in the pig industry to prevent post-weaning diarrhoea. Anyone who has to take antibiotics for any reason should take these cultures as a routine to prevent “super-infection” with undesirable bugs. These cultures are also an essential part of re-colonising the gut following gut eradication therapy.

Another theme of the meeting was that different bacteria do different jobs. There is still a great deal of work to do in this field, but the following points came up:

- In acute gastroenteritis one should always use probiotics as a routine
- When antibiotics are prescribed then probiotics again should be given as a routine
- Irritable bowel syndrome seems to respond best to Bifido bacteria and also saccharomyces boulardii.
- The effect of probiotics is enhanced by giving pre-biotics such as fructo-oligosaccharides 5 grams. In eczema the best bacteria are lactobacillus rhamnosus and lactobacillus reuteri and lactobacillus GG.
- VSL3 (a patented probiotic preparation of live freeze-dried lactic acid bacteria) is a good combination probiotic for all round use. It is now available on NHS prescription. In inflammatory bowel disease the best bacteria are bifidus longum, combined with 6 grams of prebiotics.

Professor Stig Bengmark recommends a combination of lactobacillus plantarum and lactobacillus paracasei, combined with the prebiotics pectin, fructo-oligosaccharides, inulin and resistant starch. Professor Bengmark's email address is stig@bengmark.se
Many of my patients who are allergic to dairy products and soya cannot make their own ferments. However, Nutramigen now produce a baby milk which has probiotics already added.



Fermentation in the gut and CFS

I am most grateful to Dr Henry Butt from Australia for providing essential information!

The normal state of affairs

The stomach, duodenum and small intestine should be free from micro-organisms (bacteria, yeast and parasites – hereon called bugs). This is normally achieved by eating a STONE AGE DIET, having an acidic stomach which digests protein efficiently and kills the acid sensitive bugs; then an alkali duodenum, which kills the alkali sensitive bugs with bicarbonate; then bile salts and pancreatic enzymes to further digest protein, fats and carbohydrates. The small intestine does more digesting and also absorbs the amino acids, fatty acids, glycerol and simple sugars that result.

Bugs flourish in the large bowel, where foods that cannot be digested upstream are then fermented to produce many substances highly beneficial to the body. This also generates heat to help keep us warm. The human body is made up of 10 million million cells, in our gut we have 100 million million bugs or more, i.e. ten times as many! Bugs make up 60% of dry stool weight, there are over 500 different species, but 99% of bugs are from 30-40 species.

R.E.D. laboratories from Belgium can measure the amount of different bacteria in a stool sample. Per gram of stool we should have:

- Total bacterial count between 10 thousand million (10 billion) and 1 million million (1 trillion).
- Total anaerobe (oxygen hating) count between 1 hundred million and 1 million million
- **Bacteroides (fragilis and urealyticus) 90 million to 950 thousand million ie most!**
- **Bifidobacterium between 5 million and 500 million**
- **Lactobacillus between 500 thousand and 10 million**

And extras:

- Eubacterium less than a thousand million
- Prevotella less than 500 million (a member of bacteroides which has specialised to live in the upper gut)
- Porphyromonas less than 500 million
- Clostridium less than 500 million
- Peptococcus less than 100 thousand.
- Others

- Total aerobe count between 10 million and 100 million
- **E-coli between 7 million and 90 million**

And extras:

- Enterococcus less than 500 thousand
- Staphylococcus less than 200 thousand
- Streptococcus less than 300 thousand
- Yeasts less than 10 thousand
- Others

Bacteroides are by far and away the most abundant bugs. It is bacteroides which allow us to digest cellulose and make short chain fatty acids. This is the main source of food for the colonocytes, the cells lining the bowel and if this is low, then it will result in atrophy of the colon. Short chain fatty acids also protect us from hypoglycaemia. Indeed it is estimated that up to 540Kcal per day may be generated – a very significant source of energy! They are essential for recycling of bile acids – so low levels of bile acids would indicate poor levels of bacteroides. They occupy the surface of the gut so preventing pathogenic species (such as salmonella, shigella and clostridia) from adhering and causing infection. There is no probiotic which

contains bacteroides. This is because it is also a potential pathogen! We just have to feed the gut with the right food (prebiotics) found in pulses, nuts, seeds and vegetables.

E-coli – one gram of stool should contain between 7 million and 90 million. E-coli ferments to produce folic acid, vitamin K2 (this protects against osteoporosis), Co-enzyme Q10 (essential for mitochondrial function), together with 3 amino acids, namely tyrosine and phenylalanine (these are pre-cursors of dopamine, lack of which results in low mood) and tryptophan. Tryptophan is a pre-cursor of serotonin, which is responsible for gut motility. So, if there are low counts of E-coli, one can expect problems in all the above areas, i.e. osteoporosis and bone problems, mitochondrial function, low mood and poor gut motility. Dr Butt told me about a study done in Germany where E-coli probiotics were given in the treatment of constipation and there was a dramatic improvement from 1.6 motions a week to 6, illustrating the effects on motility! E-coli is contained in the probiotic Mutaflor produced commercially in Germany.

Lactobacilli – ferment sugars to lactic acid, which provides an acid environment in the large bowel to protect against infection. Also highly protective against bowel cancer. Abundant in Kefir.

Bifidobacteria – assist digestion, protect against development of allergies and cancer.

Streptococcus – streptococcus ferments to produce large amounts of lactic acid. This gives a tendency to acidosis. Lactic acid is metabolised in the liver by lactate dehydrogenase, so high levels of this may indicate bowel overgrowth with streptococcus. Fermentation produces two isomers of lactic acid, namely L-lactate and D-lactate. It is D-lactate which is the problem, the body cannot metabolise this, it accumulates in mitochondria and inhibits them.

Prevotella (bacteroides in the upper gut) – ferments to produce hydrogen sulphide. Hydrogen sulphide inhibits mitochondrial function directly.

Problems could arise either from having **the wrong bugs in the lower gut (large intestine)**, or having any **bugs in the upper gut (stomach, duodenum, jejunum, small intestine)**.

Bugs in the upper gut

In some patients we can see bacteria, yeasts and possibly other parasites existing in the upper gut, which means that foods are fermented there instead of and before being digested. When foods get fermented they produce all sorts of unwanted products which have to be detoxified by the liver cytochrome P450 detox system. These products include:

Alcohols such as ethyl alcohol, propyl alcohol, butyl alcohol and possibly methyl alcohol. These would be metabolised by stage one into acetaldehyde, propylaldehyde, butylaldehyde and possibly formaldehyde. Alcohol and acetaldehydes result in foggy brain, “toxic brain”, feeling “poisoned” and so on. Alcohol also upsets blood sugar levels. This makes the sufferer crave sugar and refined carbohydrates – the very foods bugs need in the upper gut to ensure their own survival. This is arguably a clever evolutionary ploy by bugs to ensure their own survival!

Noxious gases such as hydrogen sulphide, nitric oxide, ammonia and possibly others. Hydrogen sulphide is known to inhibit mitochondria and block the oxygen carrying capacity of haemoglobin. It also greatly increases the toxicity of heavy metals.

Odd sugars such as D-lactate. This right handed sugar cannot be detoxified by lactate dehydrogenase, a liver enzyme. If D-lactate is present, then it could point to a problem with gut fermentation. It may result in lactic acidosis. These patients typically present with episodic metabolic acidosis (usually occurring after high carbohydrate meals) and characteristic neurological abnormalities including confusion, cerebellar ataxia, slurred speech, and loss of memory. In a review of 29 reported cases, for example, all patients exhibited some degree of altered mental status. They may complain of or appear to be drunk in the absence of ethanol intake. Indeed, this phenomenon is much better described in the vet world – D-lactate is a recognised cause in cattle of neurological manifestations. Furthermore, products of fermentation are thought to be a cause of laminitis in horses. Indeed, the encephalopathy of liver failure can be treated by gut only

antibiotics to wipe out unwelcome overgrowth of fermenting gut flora. D-lactate is fermented from sugars, including fruit sugars. This is a further reason to cut out sugar and fruit strictly from the diet! One molecule of sugar generates two molecules of D-lactate.

Other things I don't yet know about!

In theory the above toxins should all be detoxified by the P450 cytochrome system, but in practice some of these can spill over into the systemic circulation with a simple poisoning effect and resultant production of free radicals and inhibition of mitochondria.

Other problems caused by upper gut fermentation

Symptoms – for example Drs De Meleir and Butt have shown that high levels of enterococcus are associated with symptoms of headache, arm pain, shoulder pain, myalgia, palpitations and sleep disturbance. High levels of streptococcus are associated with post exertional fatigue, photophobia, mind going blank, palpitations, dizziness, faintness.

Malabsorption of micronutrients;

Nutritional supplements could make things worse. It is possible that the fermenting gut explains this. Instead of nourishing you, supplements nourish the bugs – this encourages their growth and therefore fermentation!

Wind, gas, bloating from physical distension

Disturbances of normal gut movement – constipation or diarrhoea;

Susceptibility to infections;

Leaky gut – with leaky gut, short chain polypeptides may leak into the blood stream and act as hormone mimics. For example a strip of amino acids Ser-Tyr-Set-Met would mimic ACTH – the hormone which stimulates the adrenal gland. An 8 amino acid fragment could act like glycogen and so deplete glycogen (sugar) stores in the liver.

Susceptibility to heavy metal poisoning – because hydrogen sulphide binds to heavy metals rendering them “organic” instead of “inorganic” and therefore much more likely to enter the body and bioaccumulate.

Prion disorders – heavy metals in the wrong department can twist normal proteins and convert them into pathogenic, prions which are implicated in PRION DISORDERS.

Dental, gum and mouth problems – one is likely to have similar bacteria in the mouth as the gut. If you have a clean tongue and no dental plaque then you are likely to have good gut flora.

Tests of bugs in the upper gut - gut fermentation

Biolab Gut fermentation profile – measures levels of alcohol in the blood. It also looks for short chain fatty acids, which are desirable products of fermentation by friendly bacteria in the large bowel.

D-lactate can be measured by a blood test following a carbohydrate meal, but the snag is that you have to have blood taken at Biolab as postal samples are unreliable.

Hydrogen sulphide can be tested for with a urine test.

A **good clinical test** for upper gut fermentation is whether one produces wind or gas (belching, bloating, feeling full, noisy gut etc) after eating carbohydrates!

Which bugs are there? – one can look at stool samples. That does not tell us where the bugs came from but it's a good start. Comprehensive Digestive Stool Analysis with Parasites is sometimes helpful. The bugs which are thought to be the main fermenters are enterococcus, streptococcus and prevotella (bacteria) and candida (yeast)

Conversely, in the fermenting gut there may be low levels of bacteroides, lactobacilli and bifidobacteria. This is because if there is fermentation upstream there is little substrate for fermentation downstream!

What causes upper gut fermentation?

A long history of:

- Western lifestyles! The Chinese do not eat dairy products, fruit, gluten grains or alcohol!
- Failure to inoculate the gut at birth with the correct friendly bacteria -see PROBIOTICS
- Diet
 - high in sugar and refined carbohydrate
 - low in vegetables, pulses, nuts and seeds.
 - low in other micronutrients
- Poor digestion of food
- Modern medication
 - antibiotics, which wipe out the gut flora
 - Pill and HRT, which suppress the immune system and encourage yeast overgrowth
 - acid blockers such as antacids, H2 blockers and proton pump inhibitors, which inhibit stomach acid production – see HYPOCHLORHYDRIA. Allergies to food may also result in this problem.

Why a fermenting gut can cause fatigue

Mitochondrial failure results in fatigue. There is good evidence that the central pathological lesion in CFS is mitochondrial failure. What is critical to the optimal function of mitochondria is good redox state, that is to say the balance between free radical stress and our ability to cope with those free radicals, i.e. the body's antioxidant status. Free radicals damage mitochondria so they go slow, but we have a system of antioxidants in place to protect us against this free radical stress. See ANTIOXIDANTS and METHYLATION CYCLE.

Mitochondrial activity is partly controlled by free radicals. Excessive free radical production, which cannot be dealt with by antioxidant reserves, will damage and switch off mitochondria. One would think that the largest source of free radicals comes from mitochondria themselves since here we have large amounts of glucose being oxidised in the presence of oxygen to produce energy with a large potential to produce free radicals, such as superoxide. Whilst this is undoubtedly a major source, even greater than this is the liver P450 cytochrome system. Humans are able to eat a wider variety of foods than any other mammal because of this amazing detoxification system of enzymes. It has resulted in humans becoming the most successful mammal because we can occupy almost any ecological niche. When the P450 detox system is working well, then this has enormous evolutionary advantages. However, if things start to go wrong, excessive amounts of free radicals are produced with the potential to switch on a chronic fatigue syndrome.

At this point it must be emphasised that a chronic fatigue syndrome is a protective adaptive response. If that person did not become acutely fatigued and succeeded in pushing on physically or mentally, then the excessive free radicals so generated would have the potential to cause enormous pathological damage. This is probably why we do not see wild animals with chronic fatigue syndromes – they simply push themselves to destruction because they have to survive.

The liver P450 detoxification system is a major source of free radicals. There are two stages to liver detox. Stage one is an oxidation reaction to make molecules a bit more active in order that stage two can take place, in which another molecule is stuck on. This tacking on allows the toxin to become less active and more water soluble so it can be excreted in urine. The tacking on could be of a sugar (glucuronidation), amino acid, glutathione, sulphate group and so on.

There are many possible ways the liver P450 cytochrome system could be overwhelmed.

1. Genetic – some people simply have genetically poor detox ability. One example of this, of course, is Gilbert's syndrome, where conjugation with glucuronide (stage 2 detox) is lacking. There are two steps to detoxification: the first is an oxidation reaction which may make some toxins more toxic! Many CFS sufferers have fast stage one and slow stage two metabolism, which means they have a P450 system which initially produces more rather than less toxic stress! So, for example, over 80% of Gilbert's sufferers complain of fatigue. One example is alcohol. This is metabolised initially into acetaldehyde – a nasty toxic compound which is responsible for hangovers! Alcohol intolerance is almost universal in CFS sufferers.
2. An acquired metabolic lesion as a result of nutritional deficiency. For example, many of these P450 cytochrome enzymes are highly dependent on metal co-factors such as zinc, magnesium, or selenium, B vitamins and essential fatty acids.
3. Toxins produced from normal metabolism e.g. detoxifying neurotransmitters, products from immune activity, breakdown products from damaged tissues etc
4. Overwhelming toxins from the outside world, such as persistent organic pollutants, or of course prescribed drug medication or social drugs of addiction (caffeine, alcohol). This probably explains why so many CFSs do not tolerate prescription medication. They then get labelled as unco-operative and are dropped from medical care.
5. Intoxicants arising as a result of fermentation from the upper gut.

Tests for liver detox ability

We can do **genetic tests** (such as single nucleotide polymorphisms or SNIPs) through Genova laboratories. Genova also offer **functional tests** to look at stage one and stage two detoxification.

Treatment of the fermenting gut

The definitive treatment has yet to be established. We are all on a sharp learning curve here! But the principles of treatment are:

I. Try to recreate the ideal environment for digestion of foods, viz:

1. **STONE AGE DIET** – it is sugar and refined carbohydrate which bugs most love to ferment. The diet needs to be low glycaemic index (see HYPOGLYCAEMIA) and rich in raw or lightly cooked vegetables. This is because these foods contain a range of natural antimicrobials to inhibit bacterial overgrowth in the upper gut, together with many enzymes essential for their own digestion and fibre for fermentation in the large bowel by friendly bacteria into short chain fatty acids. No fruit!
2. **Eat pulses, nuts, seeds and vegetables, i.e. foods rich in probiotics.** These provide food for bacteroides in the large bowel which ferment them to short chain fatty acids. This is the fuel for the cells lining the gut, without which they atrophy. It is also the fuel which mitochondria can switch to when blood sugar levels fall low (for example during sleep). The best sources are in pulses, vegetables, nuts and seeds.
3. **Acid stomach and alkali duodenum** – an acid stomach helps to kill bugs which are acid sensitive, whilst an alkali duodenum helps to kill bugs which are alkali sensitive. A normally acid stomach would be pH 4 or less, whilst the duodenum would be 8 or above. The pH scale is a logarithmic one so these figures represent a 10,000 fold difference in acidity.

One can test for a non-acid stomach (HYPOCHLORHYDRIA) by a simple saliva test. There is no easy way to test for an alkali duodenum. Where there is hypochlorhydria, take additional acid with food (as ascorbic acid or betaine hydrochloride). The stomach normally takes 1-2 hours to empty –

at this point take magnesium carbonate 1-2 grams, which neutralises stomach acid and assists digestion in the duodenum.

II. Improve digestion because quick efficient digestion of food means that there is less available to be fermented downstream. One may need:

- **Acid supplements.** Indeed, there may be a role for vitamin C as ascorbic acid. Ascorbic acid is acid and so improves digestion of protein. It is also toxic to all microbes including bacteria, yeast and viruses as well as being an important anti-oxidant – indeed the eventual receiver of all electrons from free radicals. Humans, guinea pigs and fruit bats are the only mammal species which cannot make their own vitamin C – we have to get it in food. Scaling up from other mammals we should be consuming 2-6 grams daily (a hundred fold more than the government RDA of 30mgs daily!). One could get the dose just right so that ascorbic acid with food sterilises the upper gut, but is absorbed and has no effect on the lower gut. If one takes excessive vitamin C it will cause diarrhoea as too much gets into the lower gut, kills off the bugs there and empties the gut completely!
- **Pancreatic enzymes** (PANCREATIC EXOCRINE FUNCTION) – the need for these could be tested by doing a comprehensive digestive stool analysis (CDSA). A dose would be 1-3 capsules of polyzyme forte (BioCare) with meals depending on the size of the meal, or creon 10,000iu 1-2 with meals.
- **Magnesium carbonate** as above
- **Bile acids** – these can be measured as part of a CDSA but ask specifically for them as they are not a part of the basic package. Take 150mgs with meals. Prevotella, the bug shown by Kenny De Meirleir to be a major producer of H₂S, is susceptible to bile acids.

III. Improve the lining of the gut

- **Chewing gum** – the parotid salivary gland provides a rich source of epithelial growth factor (indeed this is what John McLaren Howard measures in his hypochlorhydria test) which stimulates growth of the lining of the gut. Chew, because this stimulates flow of saliva. Sugar-free, additive-free gum please!

1. Dr Butt recommends the intake of **red meat** and **soya bean protein** for vegetarians (although he considers this very much second best).
2. Dr Butt recommends **glutamine** in a slow release capsule in order to bypass stomach acidity, correcting antioxidant status (superoxide dismutase, Co-enzyme Q10 and glutathione peroxidase).

IV. Avoid – antibiotics, Pill and HRT, acid blocking drugs (especially proton pump inhibitors), some antidepressants which cause dry mouth

V. Having done all the above, one can then consider direct action to change the bugs in the gut.

Treatment of low E-coli:

- **All the above** and
- **Mutaflor** – ½ a capsule daily for two days, then 1 capsule daily for seven days then 2 capsules daily for 14 days and adjust the dose subsequently according to response.
- **Prebiotics.** It is vital that E-coli is given with the prebiotic galactose (galactose oligosaccharides) mainly found in pulses and nuts. These will ferment in the large bowel to produce wind (hydrogen and carbon dioxide) – this only becomes foul smelling if other foods are poorly digested.

Treatment of low numbers of Bacteroides

- **All the above**, especially prebiotics

- Dr Butt recommends looking for a **probiotics which contain high amounts of Bifido and Lactobacillus** including Lactobacillus casei and Lactobacillus rhamnosus because these lactobacilli do not ferment to make D-lactate. OR avoid sugar strictly!

Progress can be monitored by cognitive function – that is to say the symptom of foggy brain should improve.

Treatment of high Streptococcus levels:

- **All the above**
- **Avoid glucose and fructose strictly** – each molecule of glucose and fructose will produce two molecules of lactic acid and create a marked tendency to acidosis. Dr Butt is Chinese and he points out that Chinese people do not eat fruit at all. Only the wealthy Chinese do and then very occasionally. Glucose and fructose is potentially very damaging to the body because it gets fermented by streptococcus into D-lactate. This is another mechanism by which sugars can result in foggy brain.
- **Erythromycin** 500mg twice daily for 7 days or any such macrolide. Perhaps longer. Happily bacteroides, the most abundant probiotic is largely resistant to erythromycin!
- **Magnesium carbonate and pancreatic enzymes.** One can monitor progress through the foggy brain symptom – this should improve and as it does so one can tail off the Erythromycin, but continue with an E-coli probiotic.

Treatment of High Enterococcus

- **All the above**
- **Kefir** contains bacteriocins which inhibit streptococcus. But it also contains lactobacillus plantarum which can ferment sugar to D-lactate, so avoid sugar strictly if this is your problem! L. Plantarum has good anti-inflammatory action which makes it a desirable probiotic in inflammatory bowel disease.

Prevotella species – there does not appear to be an antibiotic that Prevotella is sensitive to, but it can be reduced by taking **bile salts**. These are also available on prescription as Ursodeoxycholic acid and I would suggest 150mg with meals, perhaps more!

Replete with probiotics

For this to be effective one should take high doses of actively fermenting probiotics. I like to use Kefir, which is easily grown on many substrates (I use soya milk) and one sachet lasts a lifetime since a new culture can be grown from the previous. See PROBIOTICS and KEFIR. I suggest one cupful after meals. Avoid sugar and fruit when using Kefir. This is rich in lactobacillus. For E coli use Mutaflor – I have not yet tried culturing Mutaflor but it should be possible in theory.

See also YEAST AND CANDIDA



Acid-alkali balance

Maintaining the correct acidity/alkalinity (or pH) of the blood is an essential part of good health. Acidity and alkalinity is determined by the concentration of hydrogen ions - the lower the pH, the greater the acidity and the greater the concentration of hydrogen ions. It is important to realise the pH scale is a logarithmic one. This means that the difference between a pH of 7 and 4 means a thousand fold increase in hydrogen ions. Such a shift would have a massive effect on biochemical processes, most of which are exquisitely sensitive to pH changes. For normal metabolism, the pH of the blood is tightly controlled by the lungs and the kidneys. In the short term the lungs compensate where there is a tendency to acidosis by slowing breathing so retaining carbon dioxide and increasing bicarbonate,

and with that pH. In the medium term the kidneys compensate - where there is acidosis, we pee out acid.

This works fine when we have enough acid or bicarbonate to play with. We run into problems when we don't. Where there is poor mitochondrial function, we slip into anaerobic metabolism and produce lactic acid. This chronic overproduction puts us into a permanently acidic state. This means that any person with a tendency to fatigue and anaerobic metabolism is likely to be chronically acidotic. We try to correct this by peeing out acid, but there is only so much we can do! The possible effects of being acidic are:

- **Hypoglycaemia** - an acidic body means we cannot release glucose from the liver, nor can we make use of sugar in blood and muscle (glycolysis is inhibited). So mitochondria are further starved of energy and the sufferer craves carbs, feeling ghastly when he does not eat.
- Muscles contract less strongly (see below)
- **Acid urine strips out minerals** so we lose minerals too easily. Acidic urine is a risk factor for osteoporosis.
- Plasma potassium levels may rise.

Hyperventilation will worsen any tendency to acidosis because it washes out carbon dioxide, and therefore bicarbonate, from the blood.

Muscles and acidity

I suspect there is another effect on muscles. To understand this, think how muscles work. There are two important protein components, namely actin and myosin. They interact like little men rowing a boat. The actin oars are dipped in the myosin water and pull, so shortening the muscle fibre. The oars are lifted out and take another bite of water so the muscle filament is ratcheted shorter. This process depends on the oars being alternately sticky and then letting go. This is depended on electrical forces. One moment there is attraction and stickiness, next repulsion to let go. These electrical forces are controlled by electrons and protons, i.e. pH is vital! If the pH is wrong, the oars are too sticky, do not let go of the myosin and there is muscle damage. I suspect this acidic tendency clinically is associated with sore muscles, muscle cramps, spasms, tics and restless legs.

Once started on magnesium carbonate, many people comment that their early morning stiff muscles are much improved!

Calcium and acidity

One of the biochemical problems that John McLaren-Howard has identified is a tendency for calcium to build up inside cells. The cells try to tuck it out the way by sticking it on to calcium containing proteins, such as calmodulin, calcium-actin or CaATPase. This is OK in the short term, but eventually these mechanisms become saturated, free ionised calcium rises and inhibits many of the mechanisms for energy production in the cell. This calcium is not responsive to magnesium administration, so what to do about it? We honestly do not know! BUT calcium and hydrogen ions are intimately related and the optimist in me is hoping that an alkaline environment will help correct the biochemical abnormalities. Watch this space!

Diagnosis

Easy and cheap. You simply measure urine pH with litmus paper. The idea is to get the pH between 6.5 and 7.0. Water has a neutral pH of 7.0. Adjust the body's pH with judicious doses of magnesium bicarbonate starting with 1-2 grams at night, but see below! You do not want to upset normal stomach acidity at the wrong time!

Acid and alkali in the gut

This is a vital part of sterilising the gut, providing the correct pH for digestion and absorption of food and minerals. We need an acid stomach (pH 4 or below) to kill off the acid sensitive bugs. This acidity also digests protein and controls the emptying of the stomach (see Hypochlorhydria). Food remains in the stomach for 1-2 hours, then empties into the duodenum. Here we need an alkali environment (pH 8, i.e. a 10,000 fold decrease in hydrogen ions) to kill the alkali sensitive bugs, and allow pancreatic enzymes and bile salts to work to digest fats, carbohydrates and some proteins. Normally, the liver produces this bicarbonate but can only do so if it has the raw materials to play with.

Thus by manipulating the pH in the gut we protect ourselves from infections - something which many CFSs are not good at! Many are helped by taking acid with meals, such as ascorbic acid or betaine hydrochloride. We can help the body further by taking magnesium carbonate to neutralise this acid 1-2 hours after eating food. It is important not to take the magnesium bicarbonate with food or the gut function will be upset. You can check that you are somewhere near by measuring urinary pH. Do not overdose with magnesium carbonate or you will run into problems of being too alkali. You do not have to be too accurate as the body is very good at compensating so long as it has the basic raw materials to do so.

A traditional remedy is sodium bicarbonate. The problem is this produces a sodium load which, with Western diets, we are already overloaded with. Magnesium carbonate is a good option because magnesium deficiency is common, and magnesium is all too easily excreted. Often people report improved bowel function as a result of the additional magnesium.

Bicarbonate and cancer

Alkalinisation has been described as the poor man's cancer treatment. Western diets are a major risk factor for cancer and most people eating Western diets have a tendency to acidosis.

Bicarbonate and pain relief

This is a traditional remedy for pain relief most notably cystitis in women! But can be effective for other types of pain!

Detoxification - the oil filters, catalytic converter to keep the car clean

As part of normal metabolism, the body produces toxins which have to be got rid of, otherwise they poison the system. Therefore, the body has evolved a mechanism for getting rid of these toxins and the methods that it uses are as follows:

- Antioxidant system – for mopping up free radicals. See ANTIOXIDANTS
- The liver – detoxification by oxidation and conjugation (amino acids, sulphur compounds, glucuronide, glutathione, etc) for excretion in urine.
- Fat soluble toxins can be excreted in the bile – the problem here is that many of these are recycled because they are reabsorbed in the gut.
- Sweating – many toxins and heavy metals can be lost through the skin.
- Dumping chemicals in hair, nails and skin, which is then shed off.

This system has worked perfectly well for thousands of years. Problems now arise because of toxins which we are absorbing from the outside world. This is inevitable since we live in equilibrium with the outside world. The problem is that these toxins may overwhelm the system for detoxification (such as alcohol), or they may be impossible to break down (e.g. silicone, organochlorines), or they may get stuck in fatty organs and cell membranes and so not be accessible to the liver for detoxification (many volatile organic compounds).

We all carry these toxins as a result of living in our polluted world. However, much can be done to get rid of them or release our load and the mechanisms that we can employ are as follows:

STONE AGE ORGANIC DIET – reducing the toxic load from pesticides or food additives is obviously essential. Increasing the fibre content of food and the bacterial numbers in the gut also facilitates detoxification. Just not being constipated is helpful!

VITAMINS AND MINERALS – if the body becomes deficient in a mineral such as zinc, it will grab hold of another mineral that looks a little bit like zinc. Typically nickel or cadmium fits the bill. If one is deficient in selenium, then mercury or aluminium is “used” by the body instead. So being deficient in an essential micronutrient will encourage the body to accumulate toxic ones. Vitamin C strips out many heavy metals. Vitamins and minerals also act as essential co-factors to allow liver detoxification - see NUTRITIONAL SUPPLEMENTS.

PROBIOTICS - Taking probiotics encourages the good bacteria which have lived in harmony within the gut for thousands of years and facilitate detoxification of chemicals and production of essential nutrients. See PROBIOTICS (KEFIR)

EXERCISE – mobilises toxins from fat through generation of heat and through generation of far infrared light. This literally shakes up the molecules so that those not well stuck on are mobilised and available for detoxing. Exercise also facilitates sweating and all toxins can be eliminated through the skin, either by sweating, or by mobilisation onto the fatty layer on the surface of the skin, which can then be washed off.

SPA THERAPY, SHOWERS AND WASHING – this is an essential part of exercise or far infrared saunaing. Having mobilised toxins from subcutaneous fat onto the surface of the skin, they then need to be washed off. However, beneficial minerals can be absorbed through the skin and this is

the basis of spa therapy. People have worked out from practical experience over hundreds of years which spas are suitable for different medical conditions. For example, Epsom spa, which is full of Epsom salts (magnesium) is an excellent treatment for arthritis and joint pains. See TREATING MAGNESIUM DEFICIENCY

SAUNA – I have now done several tests on tens of people before and after saunaing where the tests prior to saunaing demonstrate the toxic load of either pesticides, volatile organic compounds, heavy metals, or whatever. When I have re-tested, in every single case every parameter has been improved. This only applies currently to eighteen patients, but because the results are so positive, I can now be confident that saunaing is a good way of detoxing. The important thing to remember is that saunaing does not just get rid of the nasty toxins, it also gets rid of beneficial minerals, so it is very important to re-hydrate with water containing these minerals. See FAR INFRARED SAUNA

CHELATION THERAPY – in chelation a large molecule such as DMSA, DMPS, or EDTA is used either orally or intravenously to chelate out toxic minerals. There is no doubt that this technique is effective at increasing urinary excretion of these metals. Some people do not tolerate the chelating agent very well, although most do. There have been concerns about chelation therapy that perhaps it is mobilising metals from outside the brain into the brain, which is obviously undesirable. However, I have no evidence to support this assertion; it is just something to be mindful of. This is why more recently I have moved over to saunaing instead of chelation therapy. See MERCURY DETOXIFICATION

LIPID EXCHANGE – the idea here is to replace contaminated fats in cell membranes and fatty organs with clean fats. This technique has been pioneered by Patricia Kane in America, who uses intravenous organic phospholipids in patients with problems such as Parkinson's disease, autism, motor neurone disease, or whatever to flush out neurotoxins stuck in fats in brain cells. She sees remarkable success. Similar results can be achieved by taking fats by mouth, but they are not quite so dramatic. Oral therapy would include high dose organic phospholipids such as lecithin and egg yolk, combined with essential fatty acids from the Omega 3 and 6 series. I use VegEPA. See LIPIDS (Fats, Membranes, the Healthy Brain and Mitochondria), VEGEPA

COLONIC IRRIGATION – this will have a marked short term benefit of reducing the toxic load in the gut for obvious reasons.

METHYLATION CYCLE – also centrally involved in detoxification! Chronic Fatigue Syndrome is a symptom, not a diagnosis, and the name of the game is to identify the underlying causes. In fatigue syndromes we don't see macro-pathology, we see micro-pathology – that is to say the problems are bio-chemical and occur at the molecular level.

There are several cycles, which I now know to be centrally important in causing fatigue. All these cycles interlink with each other like Olympic rings and getting one cycle going will drive another. The important cycles which I know to be major players include blood sugar wobbles, allergy problems, sleep cycles, mitochondrial function, anti-oxidant status, the NO/OONO cycle, thyroid and adrenal hormones cycles and de-toxification. I am greatly indebted to Rich van Konynenburg for updating me on a new player which interlinks with many of the above, namely the methylation cycle. See METHYLATION CYCLE. (refer to website or phone in for handout)

Probably others!

How can one test for toxic load? (Test names are *in this font*)

Many of the functional biochemical tests I do regularly show evidence of toxic stress, which we can then investigate by other means. For example, when measuring levels of *superoxide dismutase*, it is common to find the gene that codes for SODase is blocked. This can be investigated further by doing *DNA adducts*.

- *DNA adducts* looks at a whole range of chemicals that may be stuck onto DNA – this is an important thing to know because a chemical stuck onto DNA is potentially a pre-malignant condition.
- Tests of *mitochondrial function* often show blockage to translocator protein. This can be investigated further by looking at chemicals stuck on to *translocator protein*.
- *Fat biopsy* – this is an extremely useful way of looking at what may be stuck in one's fat and can pick up a whole range of pesticides and volatile organic compounds. It is a very easy test to do – just the fat contained in the bore of the sampling needle is sufficient for analysis.
- *Kelmer test* – this is a challenge test to look for heavy metals in urine. The problem with sweat tests and hair tests is that some people are poor detoxifiers, do not dump heavy metals efficiently in sweat and hair, or even urine and therefore these tests are misleading. A Kelmer test is a useful way of getting around this problem. The idea here is to take a substance such as the Kelmer agent (a chelating agent), or a therapeutic dose of selenium or zinc in order to displace heavy metals. This can give one an idea of metal toxicity. Anybody who has any amount of dental amalgam filling will test positive for mercury with a Kelmer tests.
- *Sweat tests* – this can be a useful way of picking up heavy metals, but some people who are poor detoxifiers do not seem to get rid of heavy metals in sweat, so this can be unreliable.
- *Hair analysis* – this can be a useful way of picking up heavy metals, but some people who are poor detoxifiers do not seem to get rid of heavy metals in hair. Again, this may be unreliable.
-

Some substances cannot be tested for easily because they get into the body, cause damage and then leave the body. Obvious examples are formaldehyde, fluoride, noxious gases, carbon monoxide, sulphur dioxide, nitrous oxide and radiation damage. Drugs of addiction such as heroin, cannabis, ecstasy can all be detected by drug screening in a person who has recently imbibed such a drug. My website does not offer these tests.

Many toxins such as alcohol and prescription medications cause damage, but are not looked for or do not come up in routine tests. Silicones cannot be detected because they are so closely related to glass, furthermore, silicone is universally used in sampling equipment such as needles.

John McLaren-Howard now has a new tool which looks at the infra-red spectrum which emanates from molecules which allows him to identify them. This means he can now identify many more substances than previously possible and allows us to further hone treatment.

Which toxins are found regularly

There is no one test for all chemical poisoning. However, having now done many hundreds of these tests I am beginning to get a feel for what comes up more often than others. Obviously it depends to what somebody is occupationally exposed, for example organophosphates come up very commonly in farmers with sheep dip flu, but rarely in others. What I find most commonly are as follows:

- Nickel and other metals such as mercury (dental amalgam), cadmium (smoking).
- Polybrominated biphenyls – known carcinogens used as fire retardants in soft furnishings.
- Lindane – and other organochlorines used as timber treatment in houses and gardens.

- Molecules indicating poor antioxidant status – such as malondialdehyde and other lipid peroxides.
- Nitrosamines result from smoked food or smoking.
- Hair dyes – it is frightening how often diazole hair dyes turn up stuck on to DNA.
- Triclosan – a commonly used disinfectant.
- Toxic fats – e.g. trans fats or fats that have resulted from cooking at high temperatures such as Diolen.
- However many toxins cause damage and then leave such as formaldehyde and other noxious gases – Sox NOx COx.

The major causes of toxicity, in my opinion, in order of importance:

- Dental amalgam
- Air pollution – from polluting industry. This is a very major cause of asthma and respiratory disease, heart disease, cancer and birth defects.
- Indoor air pollution – fire retardants, formaldehyde and other such volatile organic compounds, cosmetics (especially hair dyes and aluminium containing deodorants), wash powders and cleaning agents.
- Cooking – nickel from stainless steel saucepans, trans fats from poor quality of food, or burnt food.
- Pesticide residues in food.
- Smoking – nitrosamine and cadmium.
- Occupational exposure in farmers, Gulf War veterans, firemen with 9/11 syndrome, aeroplane industry (see www.aerotoxic.org)
- Silicone prostheses – breast implants
- Traffic pollution – benzene. Other pollutants such as noxious gases are not picked up in these tests.

Good nutrition is highly protective against toxic stress – this is further reason to take nutritional supplements – we all have nasty toxins on board which cause on-going damage to the body. Good levels of antioxidants (vitamins ACE and selenium) help protect, good levels of B vitamins help detoxify, good levels of protein, essential fatty acids and other minerals help to repair the damage.

A good example of this in action came out of the research into thalidomide. This drug prescribed to women in pregnancy as a “pregnancy safe hypnotic” caused serious birth defects if the women took it between the 38th and 42nd day of pregnancy. But not all babies were affected. This drug was tested in rats – no offspring were abnormal. This was a mystery to researchers, until someone had the bright idea of putting the rats onto nutritionally depleted diets. Then they started to get the foetal abnormality of phocomelia (“flipper limbs”). It was a combination of toxic stress (the drug) and nutritional deficiency which caused the problem to become apparent.

Antioxidants - *the cleaning system*

What allows us to live and our bodies to function are billions of chemical reactions in the body which occur every second. These are essential for the production of energy, which drives all the processes of life such as nervous function, movement, heart function, digestion and so on. If all these enzyme reactions invariably occurred perfectly, there would be no need for an antioxidant system. However, even our own enzyme systems make mistakes and the process of producing energy in mitochondria is highly active. When mistakes occur, free radicals are produced. Essentially, a free radical is a molecule with an unpaired electron, it is highly reactive and to stabilise its own structure, it will literally stick on to anything. That “anything” could be a cell membrane, a protein, a fat, a piece of DNA, or whatever. In sticking on to something, it denatures that something so that it has to be replaced. So having free radicals is extremely damaging to the body and therefore the body has evolved a system to mop up these free radicals before they have a chance to do such damage and this is called our antioxidant system.

In recent years even more stress has been placed on our antioxidant system because we are increasingly exposed to toxins, which often exert their malign influence by producing free radicals. Therefore, it is even more important than ever to ensure good antioxidant status.

Free radicals effectively accelerate the normal ageing process and antioxidants slow the normal ageing process. The best example that we have all seen is the effects of smoking - cigarette smoking produces large amounts of free radicals and people who have smoked for many years have prematurely aged skin as well as dying younger from cancer or arterial disease – problems one expects to see in the elderly. Conversely, people who live and eat in a healthy way age more slowly.

The Normal Antioxidant System

There are many substances in the body which act as antioxidants, but the most important three frontline antioxidants are superoxide dismutase (zinc and copper SODase inside cells, manganese SODase inside mitochondria and zinc and copper extracellular SODase outside cells), glutathione peroxidase and Co-enzyme Q10. These molecules are present in parts of a million and are at the frontline. When they absorb an electron from a free radical they are effectively neutralised, but they re-activate themselves by passing that electron back to second line antioxidants such as vitamins A and beta carotene, some of the B vitamins, vitamin D, vitamin E and vitamin K. These are present in parts per thousand. Again, these are neutralised by accepting an electron, but that is then passed back to the ultimate repository of electrons, namely vitamin C, which is present in higher concentrations. Most mammals can make their own vitamin C, but humans, fruit bats and guinea pigs are unable to do so. They have to get theirs from the diet and Linus Pauling, the world authority on vitamin C, reckons we need vitamin C in gram doses everyday. I recommend a minimum of 2 grams of vitamin C daily and for some patients up to six grams. Pauling himself advocated larger doses. For acute infections some people need tens of grams a day.

There are many other antioxidants present in vegetables, nuts, seeds and fruits which the body takes advantage of when they are present there in the diet. Other substances such as melatonin also have profound antioxidant properties.

Vitamin B12 is an excellent antioxidant and if I have a patient with particularly poor antioxidant status then I often recommend B12 by injection. Effectively this provides instant antioxidant cover and protects the patient from further damage whilst they take the necessary micronutrients to heal and repair their own antioxidant system.

The reason that so many medical trials do not appear to show any benefit from taking antioxidants is because the whole chain of antioxidants has to be up and running for the system to work. It is no use just giving vitamin E or A or C and expecting to see a result!

Have I got a problem with poor antioxidant status?

All the above antioxidants can be measured and almost routinely now I measure frontline antioxidants, namely Co-enzyme Q10, superoxide dismutase(SODase) and glutathione peroxidase.

The second and third line antioxidants are largely provided by doing a good STONEAGE DIET and taking my standard recommendations for NUTRITIONAL SUPPLEMENTS.

Co-enzyme Q10 is the most important antioxidant inside mitochondria and also a vital molecule in oxidative phosphorylation. Co-Q10 deficiency may also cause oxidative phosphorylation to go slow, but interestingly not invariably. My experience is that levels are almost always down and that they can be corrected by taking Co-enzyme Q10 300mg daily for three months, after which continue with a maintenance dose of 100mg. Since mitochondria are responsible for the ageing process, one could argue that Coenzyme Q10 is the most important anti-ageing molecule!

Superoxide dismutase (SODase) is the most important super oxide scavenger in muscles. Deficiency can explain muscle pain and easy fatigability in some patients. SODase is dependent on copper, manganese and zinc and I would expect this to be maintained in people taking my physiological mix of minerals (MMMs). However, when there is a deficiency, these minerals are taken separately. Experience shows that the best results are achieved by copper 1 mg in the morning, manganese 3mg midday and zinc 30 mg at night. Low dose SODase may also be caused by gene blockages and these are also looked at when the SODase test is done. Blockages are most often caused by toxic stress, such as heavy metals and pesticides.

Glutathione peroxidase (GSH-Px) is made up of glutathione, combined with selenium. There is a particular demand in the body for glutathione. Not only is it required for GSH-Px, which is an important frontline antioxidant, but it is also required for the process of detoxification. Glutathione conjugation is a major route for excreting xenobiotics. This means that if there are demands in one department, then there may be depletions in another, so if there is excessive free radical stress, glutathione will be used up and therefore less will be available for detoxification and vice versa. Of course, in patients with chemical poisoning or other such xenobiotic stress, there will be problems in both departments, so it is very common to find deficiencies in glutathione.

If there is a deficiency of GSH-Px, then I recommend that patients eat a high protein diet (which contains amino acids for endogenous synthesis of glutathione), take a glutathione supplement 250mg daily, together with selenium 200mcg daily (which is present in my physiological mix of minerals MMMs). Blood levels correct reliably well on this regime.

PART V: OTHER IMPORTANT BITS OF THE CAR TO LOOK AFTER



Avoid viral infections and treat them aggressively

Obviously one cannot avoid all viruses, but do your best. There tends to be a mini-epidemic of colds at the start of every school term as every virus acquired is shared around! Don't travel to exotic locations and risk picking up some horrible bug. Vaccinations can certainly trigger flares of CFS – some are probably essential and less likely to cause CFS such as tetanus and oral polio. Most other vaccinations have the potential to flare CFS.

My view is that influenza vaccination is so poor at protecting against influenza that it is not worth having. It is also very good at triggering CFS.

The best defence against viral infections is a healthy body and healthy immune system. Indeed I believe that if you have a perfect immune system you should never get a cold. Getting a cold is a symptom of a poorly functioning immune system.

I am further concerned by the possible erosion of the immune system by excessive use of hygiene, antibiotics, vaccinations and exposure to toxic chemicals such as pesticides. There is a place for antibiotics and vaccinations but in my opinion they are greatly overused. A recent study indicated that the rising incidence of asthma was due to over-prescribing of antibiotics in early life. Excessive hygiene (too many baths, hand washing, use of disinfectants etc) is also associated with increased risk of allergy. Recurrent infections are a real problem for some CFS patients who simply go from one illness to the next without remission. Furthermore, viruses often cause a mild immunosuppression which then opens the door for other infections to get in – not an easy situation! Actually immune suppression I suspect is a very common problem. The immune system is particularly susceptible to micronutrient deficiencies and toxic stress. Clinically this manifests as susceptibility to viral infections. Indeed if the immune system was working perfectly then an upper respiratory tract infection at worst should cause very minor symptoms for just a day or two. We all know of people who never catch a cold – these are the people with perfectly functioning immune systems. This should not be confused with CFS patients who do not get the local symptoms required to blast the virus out – ie acute rhinitis (runny nose) but just get a flare of all their CFS symptoms. In this

event the immune system is so poor it cannot mount a local acute response to physically flush out the virus.

Ensure good micronutrient status. See NUTRITIONAL SUPPLEMENTS.

Vitamin D – a recent paper from the Lancet asked the question why we tend to see more coughs colds and ‘flu in the Winter compared to the Summer. The answer is vitamin D – the only significant source is sunshine and vitamin D is highly protective against infections of all sorts. My advice is we should take at least 2,000iu daily on days where we get less than 20 minutes of good sunshine directly on our skins.

Allow inflammation. The body reacts against viruses with inflammation and the result of inflammation is either directly toxic to the virus, or helps to physically expel virus from the body. For example, viruses are very temperature sensitive – for the body to run a fever is a good thing – fever kills viruses (and bacteria). A good snotty nose helps to wash out virus from the nose and a hacking cough blasts the bugs from the lungs. Symptoms may be uncomfortable but should be welcomed as an appropriate way to get rid of virus. This is why I hate to see symptom-suppressing cold remedies such as paracetamol, antihistamines, alcohol, decongestants, cough mixtures which interfere with the body’s natural mechanisms of killing and expelling virus. **SO DO NOT SUPPRESS SYMPTOMS – THEY ARE NATURE’S WAY OF EXPELLING INFECTIONS.**

Run a temperature – there is no doubt that people who tend to run cold all the time are more prone to picking up infections and indeed this is the basis of the age old adage to wrap up well in cold weather or you will catch a chill. It would be interesting to measure your basal temperature. Low temperature can be indicative of borderline hypothyroidism and this can certainly present with recurrent infections. Children are very good at running a temperature at the first sign of virus, but adults less good. At one stage Boots used to market a product called rhinotherm which blasted hot air into the nose – the idea is that you inhaled this at the first sign of a cold and for some people it got rid of the virus. I know some patients can get rid of a virus by giving themselves a temperature – i.e. using a hot bath to get themselves as hot as possible and then wrapping up in blankets with a hot water bottle to make themselves sweat it out. I know some athletes deliberately go running in order to induce a temperature, sweat out a virus, but I have to say this is extremely risky and not something I would recommend as it could trigger a flare of CFS!

The only exception to using paracetamol for fevers is in some children who tend to get fits if their temperature goes up too high. In this event paracetamol and tepid (have you ever had a fever and cold water splashed on you?) sponging should be used to prevent this happening. It is therefore doubly important in these children that micronutrients are used to improve the immune response.

Rest and warmth sound like common sense but are ignored by many. Rest allows the immune system to work unhampered whilst warmth kills bugs. Some people find a hot bath or a sauna produces an artificial fever and helps get rid of infection. So much CFS is triggered by the workaholic who continues to strive even when they are ill.

Take high dose vitamin C. Vitamin C kills all bacteria and viruses, but is remarkably non-toxic to human cells! Firstly use the neutral form of vitamin C (magnesium ascorbate – does not dissolve tooth enamel), open a capsule a tip into the mouth. It quickly dissolves in saliva. Hold in the mouth for as long as you can – this gets rid of all microbes in the mouth including dental plaque. Secondly take large doses of vitamin C (as ascorbic acid – acidifies the stomach and kills microbes there) dissolved in water or fruit juice. I suggest 10 grams initially and then more or less according to symptoms. Aim to cause diarrhoea – this is called taking vitamin C to bowel tolerance. One’s bowel tolerance increases with illness as more vitamin C is needed.

Zinc drops 10mgs four times daily into the mouth kills microbes. Zinc is probably the most common deficiency resulting in poor immunity.

Check for hypochlorhydria (low stomach acid). Most bacteria and viruses get into our bodies either by inhaling them or swallowing them. One interesting exception is measles virus which gets in through the conjunctivae of the eye. Those inhaled are caught in the mucous which lines the respiratory tract, are swept up and swallowed. All end up in the stomach where they should be killed by stomach acid. However where there is low stomach acid ie HYPOCHLORHYDRIA the bugs will survive to cause infection. When I test for hypochlorhydria in CFS I often find it – ie I suspect this is a risk factor for infections and therefore CFS.

Consider a detox regime. There is no doubt that chemicals have immuno-suppressive effects – they also depress the bone marrow and this could explain borderline anaemia and low white cell counts. I often do fat biopsies on patients and invariably find raised levels of pesticides or volatile organic compounds – indeed I have yet to see a normal result – and all these chemicals cause immune suppression. Increasingly I am coming to the view that we should all do detox regimes. First of all we should avoid chemicals as much as we possibly can, secondly take good micronutrients to improve the liver detoxification of chemicals and thirdly sweating regimes. Obviously the most physiological sweating regime is to take exercise, but impossible in CFS patients. Far infra red saunas are effective in reducing chemical loads, as demonstrated by doing fat biopsies before and after sweating regimes.

Think allergy – allergy to dairy products often presents with recurrent infections especially tonsillitis. Sometimes allergy symptoms can present with symptoms of an acute cold – ie rhinitis and cough.

Think thyroid – hypothyroidism may present with a tendency to infection because the body runs cold and the immune system goes slow.

Avoid female sex hormones which are immunosuppressive and increase susceptibility to viral infections.

There are some very useful antiviral herbal preparations on the market such as colloidal silver and Echinacea, propolis 600mgs three times daily, lime tea etc. but it is really a case of trying as many things as you can until you find a combination that suits you.

So the basic principles are:

- Avoid where reasonably possible.
- Rest, keep warm.
- Get your micronutrient status as good as possible. Think vitamin D zinc and C.
- Do not symptom suppress! Allow a temperature.
- Aggressively attack viruses at the first symptom with heat, high dose vitamin C as ascorbic acid (swallowed) and magnesium ascorbate (dissolved in mouth) or whichever herbal preparations you find suit you.
- Check for hypochlorhydria
- Detoxify as much as possible – including sweating regimes
- Identify any allergies you may have – think dairy
- Correct thyroid hormone abnormalities – for this you need to test a free T4 a T3 and a TSH

If the symptoms of a virus do not improve after 3-4 days, then it is possible that a secondary bacterial infection has developed. A healthy body and immune system can deal with most bacterial infections, but call for professional help for less than healthy people such as the very young, old, smokers, diabetics, heart failures, history of chest infections, etc.

Common hormonal disturbances in CFS – hormones are the controllers - in this case the accelerator pedal and the gearbox!

It is now quite clear there is a distinct hormonal disturbance in CFSs with a general suppression of the hypothalamic-pituitary-adrenal axis. It is the hypothalamus-pituitary which is the “conductor of the endocrine orchestra”. If the pituitary is malfunctioning then this has knock on effects for the thyroid gland, adrenal gland, sex hormones, growth hormone and possibly the pineal (produces melatonin for normal sleep).

In practice I invariably measure thyroid hormones (TSH, T4 and T3), often prescribe melatonin and often check adrenal function. I very rarely use sex hormones. Many CFSs are substantially improved by correcting thyroid hormones and I insist all my CFS patients get fully tested. A useful book on the subject is *The Thyroid Solution* by Prof Ridha Arem ISBN 0-345-42920-6.



Underactive thyroid gland

Low levels of thyroid hormones in the blood means the “accelerator pedal” is set slow so the body will go slow. This can be underactive for three reasons – either the gland itself has failed (primary thyroid failure), or the pituitary gland which drives the thyroid gland into action is under-functioning (secondary hypothyroidism), or there is failure to convert inactive hormone T4 to active T3. The symptoms of these three problems are the same.

In primary thyroid failure, the blood tests show high levels of thyroid stimulating hormone (TSH) and low levels of T4 and T3.

In pituitary failure, the blood tests show low levels of TSH, T4 and T3.

In conversion problem, TSH and T4 may be normal, but T3 is low.

There is another problem too which is that the so-called “normal range” of T4 is probably set too low and TSH set too high. I know this because many patients with low normal T4 often improve substantially when they are started on thyroid supplements. Indeed Dr Skinner, who is a consultant virologist at Birmingham, has shown how many patients with CFS have low normal levels of thyroxine (T4) and do well when their levels are increased to average levels. The laboratory I use has a normal range of 12-22 pmol/l and I am finding many levels coming back at 9-14. In these patients there is an indication for trying T4, especially if symptoms suggest this.

Furthermore the normal range for TSH is set too high. In UK the normal range is up to 4.4mIU/l and often higher. In America anyone with a TSH above 3.0 is now started on thyroid hormones – this is because a high TSH is a risk factor for arterial disease.

Symptoms and signs of an underactive thyroid

Chronic fatigue syndrome may be a symptom of hypothyroidism – that’s why all sufferers need their thyroid checking!

Other symptoms: weight gain, lethargy, sensitivity to cold, heat intolerance, fluid retention, mood swings and depression, poor memory and concentration, hair loss, joint pains and morning stiffness, skin problems and tendency to infections, headaches, vertigo and deafness, hypoglycaemia, constipation, menstrual problems, pre-menstrual tension, digestive problems, infertility and loss of libido.

Signs: puffy face, puffy eyes, hair loss (classically the outer third of the eyebrows), cold extremities and dry skin, rashes, eczema and boils, enlargement of the tongue, hoarse voice, soft pulse or bradycardia, goitre, slowed Achilles tendon reflex. Further useful information is the basal body temperature. Use a mercury thermometer to take the temperature in the armpit over 10 minutes immediately on waking. Temperatures consistently below 97.8°F (36.6°C) indicates slow metabolic rate, which may be due to hypothyroidism.

Treatment of an underactive thyroid

This depends on the bloods tests and the clinical symptoms.

If the T4 is low and T3 commensurate with a low T4 - I would start with thyroxine 50mcgms (25mcgms for a small person or child or someone very debilitated) and increase in 25mcgms increments every month up to 100mcgms (or 75 mcgms in a small person or child or debilitated person) at which point the blood needs retesting. The aim is to get into the middle or upper half of the “normal” range. If I had a patient who was very small or very debilitated I might even start with 12.5mcgms.

If the T3 is low, and T4 normal, then I would use generic thyroid, which is a physiological mix of T4 and T3. I would start with ½ grain daily for one month, then ½ grain twice daily for one month, then 1 grain plus ½ grain daily for the third month at which point the blood need retesting. Take the second dose not later than 4pm or it may interfere with sleep. Some people like to take the second dose at lunch time to get an afternoon boost.

If the dose of thyroid was too high, then side effects would develop - hotness and sweating, fine tremor and palpitations. In this event, stop the thyroid supplement immediately. Taking additional thyroid will clearly make this situation worse. If in doubt, please phone in. Some of my patients do seem to get the symptoms of over-activity despite the blood levels being normal. This may be due to receptor hypersensitivity. In this event cut the tablet into smaller doses and build up slowly.

Thyroxine is only available on prescription and I am able to supply if your GP is not happy to prescribe. However I do insist on the patient being seen by a doctor to ensure there are no signs or symptoms of thyrotoxicosis and obviously I need to write to the GP to tell them what I am prescribing. Once stabilised I like to check levels once a year. Obviously, your GP needs to be informed.

If you are taking thyroid supplements at any time, it is always possible that you could become thyrotoxic – not through any fault of the tablet but because the thyroid gland suddenly decides to. This is unusual! If you suspect this because you develop symptoms of toxicosis such as hotness and sweating, anxiety, fine tremor, palpitations and possibly sleeplessness, then stop the thyroid supplement immediately and get your levels rechecked.

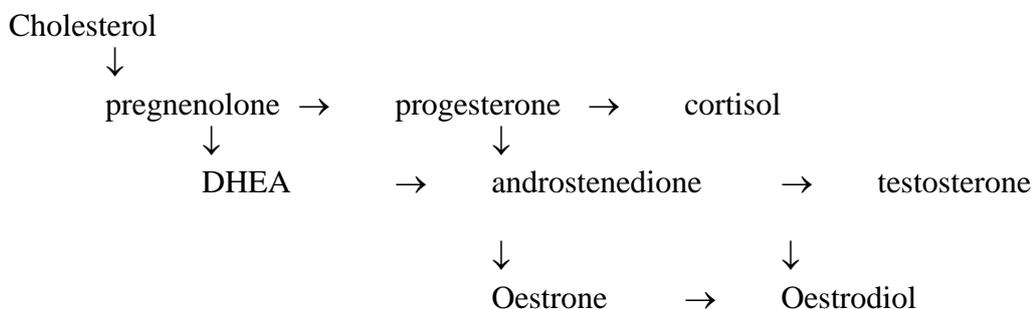
Treatment with thyroid hormones is nearly always for life.

For more information see: “Understanding thyroid disorders” by Dr Anthony Toft; ISBN: 1 903474 19 1, available from <http://www.familydoctor.co.uk/>

Also see my information handout **THYROID – THE CORRECT PRESCRIBING OF THYROID HORMONES – AND WHY THIS IS NOT HAPPENING IN THE UK**

Underactive Adrenal Gland (DHEA and cortisol) – *the gear box of the car*

The adrenal gland is responsible for the body's hormonal response to stress. It produces adrenaline, which stimulates the instant stress hormone response (fight or flight reaction). It also produces cortisol and DHEA, which create the short and long term stress hormone responses. Cortisol suppresses the immune system, breaks down tissues and has a generally catabolic effect. However, these effects are balanced out by DHEA, which has the opposite effect – activating the immune system and building up tissues. All these hormones are made from cholesterol – just one reason why running a low cholesterol is not necessarily a good thing! The sequence of events is as follows:



Both cortisol and DHEA are essential for life – too little cortisol causes the life threatening disease Addison's disease, too much causes the debilitating condition Cushing's syndrome. Then name of the game is to get the right balance. To achieve this both hormones must be measured. This can be done with the adrenal stress index (ASI) test. By measuring and supplementing within the physiological range, with biologically identical hormones, one is not going to get any unpleasant side effects i.e. we are trying to copy Nature and restore normality.

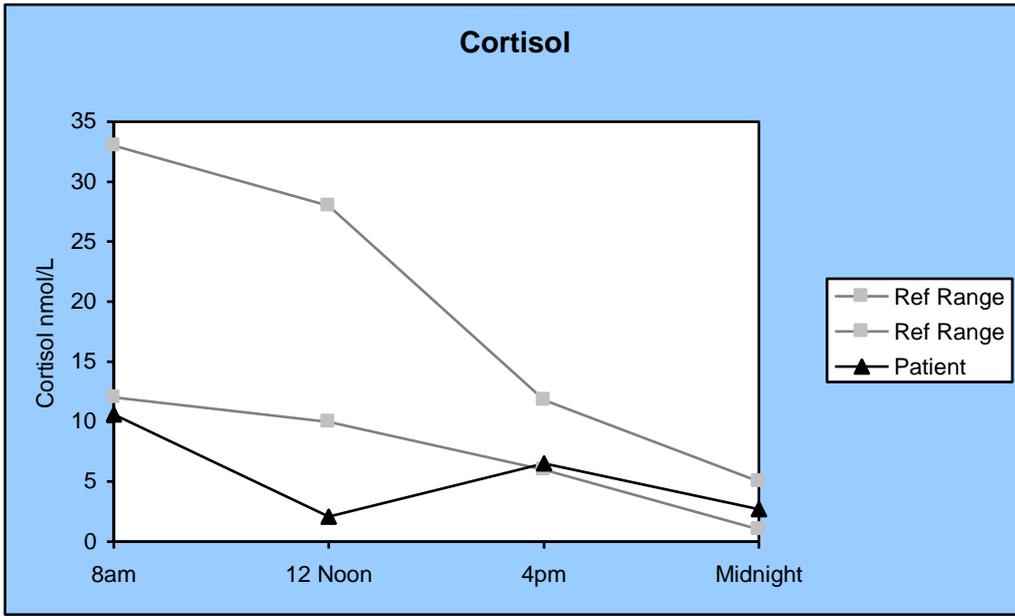
The ASI test looks at cortisol and DHEA levels over 24 hours. This test entails taking salivary samples through the day (yippee, no needles!). Indeed, salivary sampling is felt to be the most accurate way of assessing steroid hormone levels.

An abnormal result may be a symptom of other problems or it may cause problems in its own right. The response of the body to stress (any stress – infectious, nutritional, emotional, physical etc) is to increase the output of stress hormones. This gears the body up for action by raising blood pressure, increasing heart rate, improving mental alertness (which can cause anxiety), increasing energy supply and so on. It is actually metabolically very inefficient because it uses up lots of energy, but totally desirable if one has to fight for one's life! This reaction is essential for short term stress, but unsustainable long term. So time for rest and recovery is equally essential.

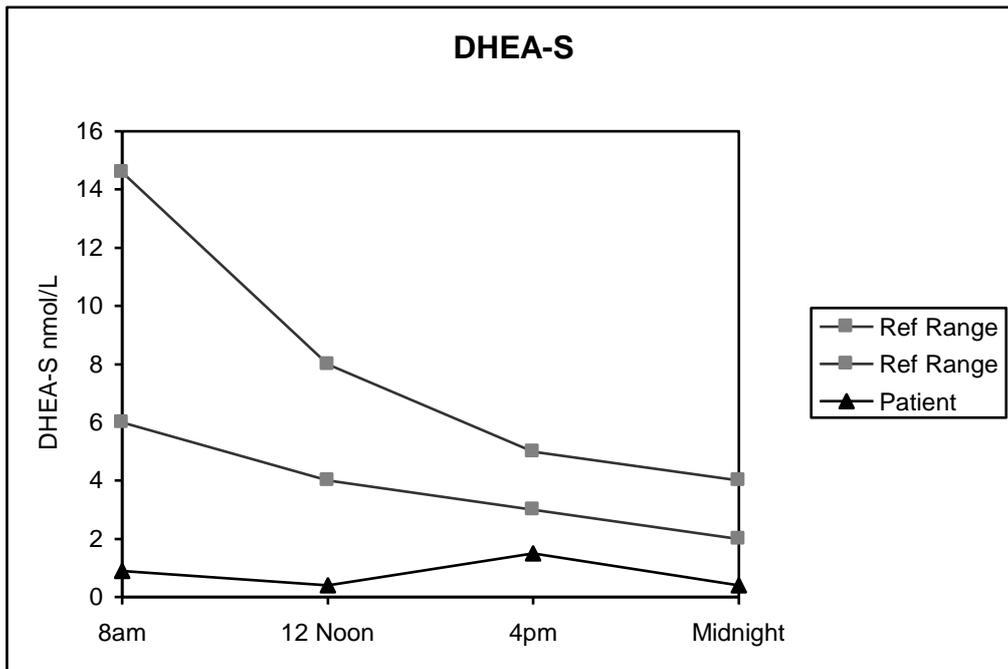
Problems arise when the stress is unremitting because eventually the output of the adrenal gland will reduce making one far less able to tolerate stress. Indeed this is often a complaint of my CFS patients – they simply do not tolerate stress at all well.

The pattern of the result from the adrenal stress test gives some idea where one is along the stress response time line.

A typical CFS adrenal stress profile test result showing low levels of cortisol and DHEA.



(DHEA-s stated reference range is age and gender related)
(Female 55-64)



Interpretation of the Adrenal Stress Index test for DHEA and cortisol levels

Levels of DHEA and cortisol vary according to the level of stress and for how long that stress has been applied. Increasing cortisol production is the normal response to stress and is highly desirable, so long as the stress is removed and the adrenal glands can recover. On-going, unremitting stress means the adrenal gland and the whole body is in a constant state of alert, does not get time to recover and eventually packs up. So, there are several stages of adrenal function gradually leading to failure:

1. Normal levels of cortisol and DHEA. Normal result. Normal adrenal gland
2. Raised cortisol, normal DHEA. This indicates a normal short term response to stress.
3. Raised cortisol and raised DHEA. The adrenal gland is functioning normally but the patient is chronically stressed. So long as the stress is removed, the adrenal gland will recover completely.
4. High levels of cortisol, low levels of DHEA. The body cannot make enough DHEA to balance cortisol. This is the first sign of adrenal exhaustion. This is the first abnormal response to chronic stress. The patient needs a long break from whatever that chronic stress may be – the commonest chronic stress is HYPOGLYCAEMIA, but also consider insomnia, mental, physical or emotional overload or whatever. DHEA can be supplemented to make the patient feel better, but it must be part of a package of recovery without which worsening can be expected.
5. Cortisol levels low, DHEA levels low. The gland is so exhausted it can't make cortisol or DHEA. By this time patients are usually severely fatigued.
6. Cortisol levels low, DHEA borderline or normal. This probably represents the gland beginning to recover after a long rest. DHEA may be used to help patients feel better whilst they continue their programme of rest and rehabilitation.

In Addison's disease there is complete failure of the adrenal gland not because of chronic stress but because of autoimmunity. This too is a life threatening disorder and the patient is severely ill. The main clinical symptom is severe postural hypotension and chronic hypoglycaemia. Addison's disease is tested for by a short synacthen test in which cortisol levels are measured before and after an adrenal gland stimulant ACTH. Many patients with CFS are given this test, which is found to be normal resulting in the patient being told their adrenal gland is fine and no action is required. The problem with this test is it only shows where the adrenal gland is completely non-functioning, it does not diagnose partial adrenal failure or adrenal stress and no measurements of DHEA are made. This makes it potentially misleading.

Treatment

The idea with treatment with cortisol and DHEA is to stay within physiological ranges. By doing this there are no side effects in the short or long term. Many doctors and patients recoil at the prospect of taking steroid hormones. Remember all the side effects of steroid hormones are created by the dose. Using physiological as opposed to pharmacological doses avoids all these problems.

A normal adrenal gland produces about 10-50mgs of DHEA daily and 20-25mgs of hydrocortisone daily. Steroid side effects would appear after a few weeks of 100mgs a day or a few months at 50mgs a day.

DHEA is available over the counter in the USA, where the FDA has classified it as a food supplement up to a daily dose of 25mgs. It is also available from www.pharmwest.co.uk. It is better absorbed taken sublingually – ie allow it to dissolve in the mouth. I start my patients on 12.5mgs for small people and 25mg for larger people of DHEA a day taken in the morning. I like to recheck a

single DHEA after 3 months to make sure I am staying within physiological ranges and because a few patients need 50mg.

Cortisol again needs to be used in sub-physiological doses – ie. up to, but not more than 10mgs a day. (Please note that the usual steroid most often used is prednisolone. 5mgs of prednisolone is equivalent to 20mgs of hydrocortisone). Both these are prescription only drugs.

After 3 – 6 months if the patient wishes to continue taking DHEA then levels need to be re-checked by doing a single sample salivary DHEA (you can order this test from my website – “DHEA (saliva) single”. Cortisol levels replete reliably well and it is not necessary to recheck levels.

As the patient improves, usually hydrocortisone can be stopped typically after 1-2 years. I suspect DHEA is an acquired metabolic dyslexia – that is to say as we age we get less good at making it. Young people can often stop DHEA as they improve and maintain levels, but older people often benefit from taking DHEA long term.

A New Hydrocortisone Trial

Another randomised, controlled, crossover trial of low-dose hydrocortisone treatment for CFS has recently been published. 32 participants, fulfilling both the Oxford and CDC 1994 criteria, completed this short-term trial. Participants received 5mg or 10mg of hydrocortisone for 28 days and placebo for 28 days.

The results revealed modest, statistically significant improvements in fatigue with this low-dose hydrocortisone treatment compared with placebo. The degree of disability was also reduced with hydrocortisone treatment but not with placebo. There was no significant difference in changes in fatigue score when 5mg and 10mg doses were compared. The authors suggest that, in view of the lack of dose response in this study, 5mg is a sufficient low dose of hydrocortisone.

Participants who responded to this hydrocortisone treatment did not differ from ‘non-responders’ in terms of their pre-treatment cortisol levels. Although none of the participants in this study had a current psychiatric illness, those who responded to hydrocortisone treatment had fewer psychiatric symptoms prior to treatment.

Based on the results of the insulin stress test, this short-term, low dose hydrocortisone treatment was not found to cause significant suppression of adrenal gland function. None of the participants dropped out of the study and only minor side effects were reported.

The authors conclude that this low-dose hydrocortisone treatment resulted in “significant reduction in self-rated fatigue and disability in patients with chronic fatigue syndrome”.

Comment

This study sheds interesting light on the possible role of low cortisol levels in the disease processes involved in CFS. Caution is required, however, in interpreting the results. Participants’ baseline cortisol levels could not predict their response to hydrocortisone treatment and participants appeared to have baseline cortisol levels within the normal reference range.

In another randomised controlled trial of hydrocortisone therapy (see Interaction 29, page 21 for a review), McKenzie at al., used a higher ‘low-dose’ hydrocortisone treatment of 25 - 35mg daily. They found that this dose was associated with some improvements in symptoms but caused significant adrenal suppression. Neither of these research teams currently recommended the use of hydrocortone as a treatment for CFS. The present study assessed the effects of hydrocortisone treatment in the short-term only. As the authors point out, further studies, involving longer durations of treatment and follow-up are required to assess the long-term effectiveness and safety of this treatment.

Reference: Cleare et al; The Lancet, 1999, Vol. 353 February 6, p455-458

Also see: THE ROLE OF HUMAN GROWTH HORMONE (HGH) AND SECRETOGOGUES TO IMPROVE PITUITARY FUNCTION

The Pill and HRT – don't take female sex hormones

A question that most of my female patients ask me at some stage is - what about the Pill and HRT? In the last few years I have become increasingly unhappy about prescribing the Pill and HRT for my patients and I am now at the stage when I actively discourage patients from using either. Essentially the Pill, especially progesterone, suppresses the immune system. Progesterone is the pregnancy hormone (pro, in favour of, gesterone, pregnancy). There is a very particular immune problem in pregnancy – 50% of the growing baby genetically belongs to the father. What should happen immunologically is that the mother should reject this baby as a foreign body. Obviously this is undesirable and to get round this the mother produces lots of sex hormones to turn off the normal immune reaction. Women are only meant to have high levels of progesterone in pregnancy. Pregnancy is a potentially dangerous time with greatly increased risk of blood clotting, high blood pressure, cancer, mental disturbances, weight gain, hormone swings and immune suppression – women largely survive because it only goes on for nine months. With the Pill and HRT there are unremitting high levels of these hormones with all these complications. Those which most concern the CFS sufferer are the immune suppression, hormone disturbances, nutritional deficiencies (these hormones induce B vitamin deficiencies, essential fatty acid deficiencies, raised copper and low zinc).

I also see many women whose CFS has followed fertility treatments when drugs such as clomephene have been used. Essentially this drug gives the pituitary a large kick. We know that in CFS there is a general suppression of the hypothalamic-pituitary-adrenal axis and this may be the last straw that tips one over into a CFS. Remember that infertility is often a symptom of poor nutritional status, toxic stress, poor adrenal and thyroid function – ie all the factors which also predispose to CFS. – see THE PILL AND HRT

Oxygen supply – your car needs a good oxygen supply to work

In order for mitochondria to be able to burn fuel to make energy they require a good oxygen supply. There are several ways in which this might be impaired:

Diagnoses which conventional medicine should pick up on:

Poor oxygen carrying capacity of the blood i.e. **anaemia** – this is usually picked up by standard medical tests.

Respiratory failure – usually obvious – the lungs have been damaged by disease such as from smoking, emphysema, chronic asthma, oedema from heart failure, pulmonary fibrosis, pulmonary embolus or whatever. Again this should be picked by conventional medicine.

Heart failure

Severe atherosclerosis (arterial disease) – blood vessels narrowed so blood supply impaired.

Diagnoses which conventional medicine usually does not pick up on:

The low output state of the heart when affected by **mitochondrial failure**

Autonomic neuropathy – which may result in low blood pressure and **postural orthostatic tachycardia syndrome (POTS)**. This has been greatly researched in CFS and is no doubt a problem. But I think that this is not the cause but a symptom of another problem – ie the low cardiac output state we see in patients with very poor mitochondrial function. In this event the heart does not contract powerfully because it does not have the energy supply to allow it to do so. This means the blood pressure falls despite the body's efforts to maintain it – ie vasoconstriction. Clinically we see low blood volumes (secondary to vasoconstriction) and fainting or severely low blood pressure when the patient stands up because the heart cannot beat powerfully enough for long enough to sustain blood pressure whilst in the vertical position. It is much less work for the heart to maintain blood pressure lying down!

Hyperventilation – the idea here is that for whatever reason, the patient over-breathes. One cannot increase the oxygen carrying capacity of the blood this way, so oxygen levels are not increased, but carbon dioxide is washed out. This changes the acidity of the blood in such a way that oxygen sticks more avidly to haemoglobin. So oxygen is not released to the mitochondria where it is required and so mitochondria go slow, so cells go slow and this results in fatigue. See **HYPERVENTILATION**. This is a common problem especially in people with a tendency to anxiety. The changes in acidity can also have an adverse effect on translocator protein function, ie mitochondria work less well and this further compounds the problem. Hyperventilation is a very common problem, so do read the further information on the website. We can test for hyperventilation by measuring a *Carbonic anhydrase in red cell*.

Carbon monoxide poisoning also results in oxygen sticking more avidly to haemoglobin and has the same effects as hyperventilation. CO poisoning from exogenous factors such as poorly ventilated heaters is well recognized – indeed it is estimated that one in twenty heating appliances leak carbon monoxide. However CO poisoning may also result from the **body's own endogenous production of CO**, when stress enzymes are induced. Again this is associated with symptoms of hypersensitivity which can be to light, noise, touch, pain, chemicals or electromagnetic radiation. See **CARBON MONOXIDE AND MULTISENSITIVITY, (MUSES SYNDROME)**. Further information from: CO-Gas Safety, Station Building, The Parade, Claygate, Surrey KT10 0PB Tel: 01372 466112/466135 website: www.co-gassafety.co.uk A support group for survivors of CO poisoning has been launched recently, called CO Awareness. Their website address is: www.co-awareness.co.uk

Brain fog - poor memory, difficulty thinking clearly etc

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What allows the brain to work quickly and efficiently is energy supply. If this is impaired in any way, then the brain will go slow. Initially the symptoms would be of foggy brain, but if it progresses one will end up with dementia. We all see this in our everyday life with alcohol being the best example - short term exposures give us a deliciously foggy brain - we stop caring, we stop worrying, it alleviates anxiety. However, it also removes one's drive to do things, one's ability to remember, impairs judgement and impairs ability to think clearly. Medium term exposure results in mood swings and anxiety (only alleviated by more alcohol), longer term use could result in severe depression and the dementia - examples include Korsakoff's psychosis and Wernicke's encephalopathy. See [Wikipedia:Korsakoff's syndrome](#) and [Wikipedia:Wernicke's encephalopathy](#). Incidentally these two examples also illustrate how most drug side effects result from nutritional deficiencies!

Good Energy Supply to the Brain

A normal synapse will pass a nerve impulse in 75 microseconds. The slower the time, the more we “lose it”. Reaction times are slowed with alcohol. If this interval extends to 140 microseconds, one has dementia. Longer than that and we go unconscious as exemplified by a general anaesthetic.

What allows good energy supply to the brain is:

Good fuel and oxygen supply

- good **blood supply** - [Arteriosclerosis - what causes it and how to prevent it](#)
- adequate **amount of blood** - [Anaemia - not enough blood - symptoms and diagnosis of](#)
- sufficient **blood pressure** [Heart failure](#)
- sufficient **oxygen** [Shortness of breath - the causes of](#)
- sufficient **fuel** [Hypoglycaemia - the full story](#)

Good mitochondrial function

One then has to be able to convert this fuel and oxygen supply into energy that the brain can use, namely ATP. See [CFS - The Central Cause: Mitochondrial Failure](#), but this is only part of the story!

Myelin sheath function

There is a further interesting peculiarity with respect to energy supply to the brain which is different from the rest of the body. Although the brain weighs just 2% of total body weight, in use it absorbs 20% of the body's oxygen requirement and 25% of its glucose needs! This cannot be explained by numbers of mitochondria in the brain (there are not enough), which means there must be another energy generating source. Brain cells are also very different from normal cells. They have a cell body, and very long tails, or dendrites, which communicate with other cells. Indeed, if a nerve cell

body from the spinal cord that supplied one's toes was sitting on my desk and was the size of a football, the tail would be in New York! These tails or dendrites are too small to contain mitochondria but it has been suggested that energy supply comes directly from the myelin sheaths themselves. They too can produce ATP and it is this that supplies the energy for neuro-transmission. Myelin sheaths are made up almost entirely of fats – so we need to look to oils and fats for improved energy supply to brain cells.

Some fascinating work by Dr Mary Newport shows that coconut oils can cure dementia - see [What If There Was a Cure for Alzheimer's Disease... and No One Knew?](http://www.coconutketones.com/whatifcure.pdf) (hyperlink to this page is: <http://www.coconutketones.com/whatifcure.pdf>) The key ingredient is medium chain triglycerides. This suggests to me that these are an essential part of this process. MCTs are an excellent energy supply to the brain which likes also to work with short chain fatty acids or ketones. You can see an interview with Dr Newport on You Tube (<http://www.youtube.com/watch?v=iScs0uzQZFk> – this is a link to part 1, and there are 6 parts).

My guess is that the myelin sheath membranes have to be just the right fluidity to allow ATP to be synthesized. If this were the case it would explain how general anaesthetics work – presently no-one really knows! If GAs upset membrane fluidity enough then energy supply to nerve cells would be switched off, the nerves would cease to work and... bingo! – not just foggy brained but unconscious!

Do not be concerned about dietary fat and cholesterol causing arterial disease! The results of some studies of Polynesian peoples for whom coconut is the chief source of energy should put your mind at rest¹.. My guess is that statins, by reducing the cholesterol that the brain loves, is contributing to our current epidemic of Alzheimer's disease. Certainly it is rare for my CFS patients to tolerate statins – nearly always they are made ill by them.

So adding coconut oil to the regime of anyone with symptoms of foggy brain to dementia is likely to be helpful, partly by improving fuel supply and partly improving membrane function.

Brain fats and oils

Humans evolved on the East Coast of Africa eating a diet rich in sea food. It is suggested that the high levels of oils, particularly DHA, allowed the brain to develop fast, thus out-stripping other mammals. So Homo Sapiens came to have bigger brains allowing intelligence to develop. There is lots of research showing that essential fatty acids are essential for normal brain function, so oils that would be helpful in addition to coconut oil would be omega 3 (fish), omega 6 (evening primrose) and omega 9 (olive oil), together with lecithin (which is phosphatidylcholine – i.e. the main component of all cell membranes).

Oils to treat foggy brain and dementia

A suggested regime to start off would be:

- Lecithin 20ml - One tablespoon twice daily
- Coconut oil 10ml - one dessertspoonful twice daily
- VegEPA (this preparation contains ultra-pure EPA – omega 3 fatty acid, from marine fish oil and gamma-linolenic acid [GLA] – omega 6 fatty acid, from cold-pressed, organic virgin evening primrose oil) – 4 capsules twice daily for 1 month, then maintenance dose of 2-4 capsules a day
- Olive oil for cooking
-

Ideally all these oils should be organic. When you get the hang of it, just slurp it out the bottle! Please, note these are just my educated guesses – there may be other useful tweakings!

Throughout life the brain creates a million new connections every second! This means there is huge potential for healing and repair - it is simply a case of moving things in the right direction! But the brain has to have the energy supply to allow this process to happen!

CFS, alcohol and foggy brains

Alcohol intolerance is almost universal in CFS. This has always puzzled me! It could be partly explained by poor detox, but clinically there seems to be some direct effect on the brain, like a hypersensitivity. The above explains all! Alcohol dissolves readily in fats and would be excellent at changing the fluidity of membranes. It works just like a general anaesthetic – and, indeed, many CFSs are intolerant of anaesthetics. My guess is that the more fat soluble a chemical, the greater its ability to produce foggy brain in CFS. This would apply to a range of prescription medication.

This knowledge is very useful clinically – those people that are intolerant of alcohol need brain fats and oils, as above. Indeed as we age, intolerance increases illustrating the increased need for the correct fats and oils as we become metabolically less efficient with time!

What I mean by brain fog

- Poor short term memory
- Difficulty learning new things
- Poor mental stamina and concentration – there may be difficulty reading a book or following a film story or following a line of argument
- Difficulty finding the right word
- Thinking one word, but saying another
-

Treatment of the foggy brain

- The general approach to maintaining and restoring good health.
- The best test for generalised atherosclerosis is fitness. All normally healthy people should be able to gently jog one mile without distress. See Arteriosclerosis - what causes it and how to prevent it and Ischaemic Heart Disease - what really causes it?. To improve fitness see Exercise - the right sort
- Can this supply of fuel and oxygen be translated into ATP - the energy for brain cells to work? See CFS - The Central Cause: Mitochondrial Failure
- Is there a steady supply of sugar to the brain - See Hypoglycaemia - the full story.
- Coconut oils likely to be very helpful - the brain works well on short chain fatty acids and ketones which are in abundance in coconut oil. These must be pure cold pressed organic virgin oils which are semisolid at room temperature - not hydrogenated oils which are hard at room temperature.
- Allergy can certainly cause foggy brain. Wheat is a common cause of brain fog. Many religious groups will fast for several days in order to “clear the brain”. Food allergy usually causes more than one symptom – often several.
- Sleep - are you getting enough good quality sleep? During sleep healing and repair takes place and without this one gradually ratchets downhill. Sleep is vital for good health - especially in CFS
- Hormonal disturbances - see Hypothyroidism - diagnosis of and Adrenal Gland - the gear box of the car (DHEA and cortisol) – underactive
- Physical and mental activity is vital. If you don't use it, you lose it! There is a desirable balance between physical and mental activity. Often the best “treatment” for mental stress is physical activity (rather than watching TV!).
- Foggy brain is often accompanied by Depression and Anxiety, but these are just symptoms which should be investigated by finding the cause.
-

Are you being poisoned?

You can be poisoned from within the body:

- Gut fermentation - fermented foods result in alcohol, D-lactate, hydrogen sulphide and other toxins being produced. Any tendency to constipation will make this worse. This may explain why colonic irrigation allows a "clearing" of the brain.
- Caffeine in the short term is a mental stimulant. This can be helpful if you have to "perform", so long as you can rest and recover afterwards. If you are having more than 3 cups a day (tea, coffee, coca cola), then it is probably having an overall deleterious effect.
- As a result of a detox regime - which mobilises toxins which have been previously dumped in fat.

Or from outside the body:

- as a result of diet - again, alcohol is also a neurotoxin. If you are drinking more than one glass of wine daily, then you will be thiamine deficient. Thiamine is essential for normal brain function.
- Prescription drugs often have profound effects on the brain, especially in older and younger people

Chemical poisoning

Look at a check list of possibilities! Chemical poisons and toxins - the more you look for it, the more you see!

Is there pathology?

Progressive brain symptoms always need investigating with an MRI scan to exclude tumours and other such anatomical lesions. See:

- Prion disorders: Alzheimer's Disease; Parkinson's Disease; Creutzfeldt-Jacob's Disease & Motor Neurone Disease
- Multiple sclerosis - the environmental approach to treating

Vitamin B12 by injection

This is an excellent treatment for foggy brain! There are many possible ways in which it may be helpful - see B12 - rationale for using vitamin B12 in CFS. Indeed I was interested to hear that when the top chess grand Masters are competing they inject themselves daily with B12 for improved performance. My organophosphate poisoned farmers love B12 as do many CFSs!

Related Articles

- Energy supply to the brain via myelin - Ravera 2009 The science behind oils and fats being so important for energy supply to the brain - hyperlink:
http://drmyhill.co.uk/drmyhill/images/7/78/Ravera_2009_-_myelin_makes_ATP.pdf
- Scientific American article - ATP is also a neurotransmitter - fascinating insights into how ATP is necessary for other neurotransmitters to work! Poor energy delivery could mean depression and neurological disease - hyperlink:
http://drmyhill.co.uk/drmyhill/images/a/a7/ATP_as_a_neurotransmitter_Sci_Amer_2009.pdf

References

1. ↑ Prior IA, Davidson F, Salmond CE, Czochanska Z. Cholesterol, coconuts, and diet on Polynesian atolls: a natural experiment: the Pukapuka and Tokelau island studies. American Journal of Clinical Nutrition 1981, Vol 34 (8): 1552-61 hyperlink: <http://www.ajcn.org/cgi/reprint/34/8/1552.pdf>

The brain in CFS – The Edge Effect – *the driver of your car*

I do like to read books by clever people who turn difficult subjects into simple concepts with practical implications for management. Dr Eric Braverman has done this with his book “The Edge Effect”. He is highly qualified, well read and refers to the same people and ideas as I do. He combines the best of recent and modern thinking and research to come up with a model of the brain that dovetails with many of the things I already know to be important in sustaining good health. However, there are some very useful “bolt on” extras! Just as DNA is made up of four subunits which, combined, provide the entire genetic blueprint for all of life on Earth, Braverman describes the brain in terms of the actions of four neurotransmitters, describes the symptoms of imbalances of each hormone so they can be recognised and explains what can be done to correct these. Many of these interventions I already recommend, such as STONE AGE DIET, NUTRITIONAL SUPPLEMENTS, SLEEP, DETOXING and so on, but Braverman directs us to further fine tuning.

The first step is to identify your personality type, which points to specific deficiencies, then try different interventions to see if they have a beneficial effect. I have summarised Braverman’s findings but you can read about them in much more detail in his book.

Dopamine predominant (frontal lobes) 17% of people

Thinking intuitives – rationalists, theory oriented, precise, love power, high energy extroverts, tend to addictions. Achievers, thinkers, problem solvers, pragmatic but do not take criticism. Love activities requiring intellect – crosswords, chess. Relish competition. Motto: “Never take anything personally”.

Too much: overly intense, driven and impulsive. Possibly violent, reckless driving, criminal behaviour. Dopamine is the “voltage” of the brain (ie height of electrical brain waves).

If deficient – becomes the loner, the procrastinator. Loses energy to socialise, loses feelings of emotion.

Symptom – inconsistent attention. Loss of working memory (ability to absorb information and use it for on-going processing).

Addiction to boost levels: cocaine, coffee, sugar.

Occupation: doctors, scientists, researchers, inventors, engineers, generals, architects.

Acetylcholine predominant (parietal lobes) 17% of people

Intuitive feelers – idealists striving to be authentic, benevolent and empathetic. Good at thinking functions such as comprehension of language, intelligence and attention. Love words, ideas and communication. Highly creative and open to new ideas. Quick thinker, considerate of others. Flexible, creative, impulsive so long as it offers the promise of excitement and something new. Intuitive and innovative. Love teaching others. Sociable, charismatic, like meeting new people. Motto: “Always do your best”.

Acetylcholine gives the brain speed (measured in alpha waves) of processing information and access stored information

Too much speed: causes panic disorders, anxiety, hysteria, sometimes manic episodes. Sufferer may give too much to others to the point of masochism. May feel the world is taking advantage of them and become paranoid and then isolated.

If deficient (too little speed) – becomes the eccentric and the perfectionist. Steers away from human interaction, lives in a dream world. Workaholic, misses out on relaxation, enjoyment and warmth. Fatigue. Learning disorders.

Symptoms of deficiency – misplacing items, carelessness. Loss of immediate memory (lasts up to 30 seconds) causing poor learning capacity and loss of basic alertness.

Addiction to boost levels: nicotine, carbohydrate binge

Occupation: teachers, community work, artists, writers, musicians, councillors, mediators, think tank, religious leaders, public service, self employed businesses.

Dopamine and acetylcholine are the ON switches for the brain, GABA and serotonin are the OFF switches. It is no surprise that most of my CFS patients are dopamine or acetylcholine types! I often think one has to undergo a personality change to get out of CFS. The personality that gets you in to it does not help you get out of it!

GABA predominant (temporal lobes) 50% of people

Characterised by stability, organisation and tradition. Guardians, caring type, look to preserve traditional values, dependable. Stable, calm, objective, level headed, punctual, confident. Tend to be homemakers, good team players, sensible, settled. Make others feel comfortable May use alcohol to calm their compulsiveness. Motto “always keep your word”.

Produce calming rhythmic theta waves – keeps brain in check, paces activity

Too much – expend too much energy on caring at the cost of getting hurt. Rely heavily on friends and crave their judgement and approval.

If deficient – becomes the unstable personality and Drama Queen. This person meets the needs of others. Moods often unbalanced and mercurial. Inappropriately theatrical, loving and living for the big moment. Attention seeking, seeking reassurance of his worth. Feel worthless and without hope. The problems of the world become his own. Depression, obsessive compulsive disorder, anxious.

Symptoms of deficiency – lack of attention, impulsive actions. Loss of verbal memory, eg inability to understand sound, words, sentences and stories.

Addiction to boost levels: diazepam.

Occupation: administrators, accountants, security officers, nurses, technicians, air traffic controllers, paramedics, planners, homemakers.

Serotonin predominant (occipital lobes) 17% of people

Sensitive preceptors. Artisans who act on impulse and seek adventure. They prize fun. Motto “live through experience”. Know how to enjoy life! Able to rest, regenerate and find serenity. Live for the moment, thrive on change, try new foods, pick up new hobbies, like a challenge just for the fun of overcoming it! Receptive to stimuli, in touch with mind and body, co-ordinated, resourceful. Not put off by a struggle. Love parties and celebrations, mountain climbing, hunting, skiing, scuba diving, anything so long as there is excitement with it! Optimistic, cheerful easy-going, want to join in and be part of the fun. Love children! Intensely loyal.

Serotonin vital at night for brain to recharge and rebalance.

Associated with delta waves in the brain.

Too much – nervous, hesitant, vulnerable to criticism, desperate desire for interpersonal relationship.

If deficient – becomes the self absorbed personality and the rule breaker. Loses sensitivity to others, flouts conventional values as beneath him, makes his own rules so others are damaged. Boundary between truth and lies becomes blurred.

Symptoms – inability to grasp concepts quickly. Loss of visual memory – inability to remember faces, colours, pictures, symbols so. Insomnia, PMT

Addiction to boost levels: alcohol, sugar bingeing

Occupation: mechanics, construction workers, drivers, military personnel, hairdressers, bar tenders, pilots, computer programmers, professional athletes, movie stars, photographers, surgeons, chiropractors, detectives, investigators, crisis intervention.

HOWEVER THE MOST IMPORTANT SYMPTOM OF A PROBLEM IN ANY OF THESE DEPARTMENTS IS MEMORY LOSS. The difference in mental processing between a resourceful mind and senility is one tenth of a second. We normally generate a reaction within three tenths of a second – if this becomes four tenths of a second we can no longer process logical thought. When the

brain slows down, and without care this starts on average at 40, we start to lose our edge. You just become less sharp. It's the old story – as you age you can stay just as fit and well but you have to work harder at it! Brain function is the most sensitive indicator of body biochemistry which means once the brain is working well, there is not much wrong with the biochemistry!

Most people have a combination of the above problems. In CFS there is probably a general deficiency of all the above neurotransmitters! Much can be corrected with the standard work-ups, but the following “bolt on extras” are often very useful! If you wish to define your type more closely, there is a detailed DIY series of questions which you can read in the book “The Edge Effect”, together with frequently asked questions. The aim is to identify then balance up the imbalances. I can't repeat this here without breaching copyright! However you can experiment with the following interventions (or get the book!) and that will give further clues and answers to your personal brain chemistry.

The Powerful Dopamine Nature

Dopamine deficiency can be helped by:

Hormones: DHEA and cortisol (see ADRENAL DYSFUNCTION) HUMAN GROWTH HORMONE THYROID HORMONES

Diet – eat foods containing phenylalanine which is converted into tyrosine, the raw material to synthesise dopamine. This means a high protein diet. Interestingly aspartame is high in phenylalanine which is maybe why diet coke is so addictive! (Aspartame is also metabolised to formaldehyde, a neurotoxin). Foods rich in tyrosine include all meats (especially wild game meats), dark chocolate, egg, walnuts.

Extra supplements: tyrosine – 1-2 grams daily, phosphatidyl serine 50-200mgs

Herbals – rhodiola 50-200mgs, ginkgo biloba 50-100mgs

The Creative Acetylcholine Nature

Acetylcholine deficiency can be helped by

Hormones: DHEA and cortisol. Human Growth Hormone

Diet – high fat (but good fats!): fatty meats, eggs, liver, nuts, quality cold pressed oils, avocado

Extra supplements: choline 100-500mgs, phosphatidyl serine 500-2,000mgs, acetyl L carnitine 250-1,000mgs, DHA 200-1,000mgs, pantothenic acid 25-100mgs, vitamin B12 100-500mcgms

Herbals – ginkgo biloba 50-100mgs, Korean ginseng 100-500mgs

The Stable GABA Nature

GABA deficiency can be helped by

Opiates! (consider LOW DOSE NALTREXONE) DHEA

Diet: complex carbohydrates to supply the raw material to make GABA namely glutamine such as nuts, vegetables, pulses, fruits. Especially avoid refined foods.

Extra supplements: inositol 500-2,000mgs, glutamic acid 250-1,000mgs, melatonin 1-6mgs, B vitamins.

Herbals: valerian 100-500mgs, passionflower 200-1,000mgs

The Playful Serotonin nature

Serotonin deficiency can be helped by

Hormones – Human Growth Hormone

Diet – tryptophan is the precursor to serotonin and comes from protein, especially game meats. Also avocado, dark chocolate

Extra supplements: 5HTP 100-500mgs, melatonin 1-6mgs, magnesium 400-1,000mgs, tryptophan 500-2,000mgs, B6 100-500mgs, fish oils, zinc 15mgs nocte.
Herbals St John's Wort 300-900mgs, passion flower 200-1,000mgs

REMEMBER WE ARE ALL A MIX OF ALL THE ABOVE AND IT IS ATTENTION TO ALL AREAS WHICH GIVES THE RESULTS!

Children are born with undisguised personalities. As we age our personality matures and the above traits should become less obvious. The aim is to balance up all of the above areas to find a state in which we are most productive and content.

The above should be done **IN ADDITION** to STONEAGE DIET, NUTRITIONAL SUPPLEMENTS, SLEEP, DETOXING and so on!



Psychological aspects of treating CFS – *the driver of the car ctd.....*

CFS Psychological or Physical?

This seemed such a stupid question that I never bothered to consider it. I estimate I must have now seen over 4500 patients with CFS and it is clear CFS is primarily a physical disorder. It is only when patients have been ill for several months and been told by their physicians that nothing is wrong they get secondary psychological problems. The only place where CFS does not exist is in the brains of small-minded doctors.

The reason the "physical or psychological" debate continues is because the usual tests for pathology come up showing normal results. GPs find ill patients, do the usual screening tests which come up "normal" (but see INTERPRETATION OF MEDICAL TESTS) and feel this allows them to turn round to patients and conclude there is nothing physically wrong. If, however, the screening tests included SPECT scans; sensitive tests of the hypothalamic-pituitary-adrenal axis; T cell subsets; tests to look at mitochondrial abnormalities, mitochondrial function tests, antioxidant status and tests of xenobiotic loads; enterovirus sequences in muscle and brain; trace element levels, vitamins, essential fatty acids and amino acid profiles, then lots of abnormalities would be found. Doctors would diagnose serious metabolic and hormone problems and patients would be taken more seriously.

The psychological issues which need addressing are as follows:

Personality – the type of person who gets CFS is the goal driven, perfectionist, workaholic. She has spent her life juggling the responsibilities of a job and family, as well as running the local community, pursuing hobbies and taking evening classes! Usually she has done this at the expense of her sleep and diet. Dopamine and acetylcholine are the ON switches for the brain, GABA and serotonin are the OFF switches. It is no surprise that most of my CFS patients are dopamine or acetylcholine types! (see EDGA EFFECT). The very personality that gets someone into CFS does not help to get them out of it! The first step is to undergo a personality change – not easy!

Being pissed off – doctors often do not distinguish between the tears of frustration at not being able to do things from the tear of depression. One has to learn to be happy with less. Not being able to do things amounts to a bereavement. Dealing with this frustration is a major problem for many.

Get selfish – most CFS sufferers have spent their lives supporting others. It does not come easily to be on the receiving end of support networks. To get well you have to look after number one.

Psychological skeletons – we've all got these. Sometimes addressing them can be helpful. But sometimes not! People who have been abused either physically, mentally, emotionally or sexually are at greater risk of CFS later on in life. This is partly because they do not feel in control of their lives and this makes it even harder to make the necessary changes to recover from their CFS. However once one restores ones energy, including mental energy, one is much better able to cope with psychological skeletons!

Learned responses – these can be a real problem because sometimes when one has identified and corrected enough of the underlying physical problems so that the person should be able to recover, the body has “learned” how to be ill and one may need to use psychological techniques for getting out of this particular rut. Indeed this can be a real problem in allergy. When one sensitises to a food or a chemical the brain “learns” the response. Then even when it is physically switched off by say EPD, the brain and immune system goes on producing the response even when the allergy is switched off. This can be very difficult to deal with! See PLASTIC ROSE.

Depression – anybody who has been ill for any length of time can get depressed, but depression is not a feature of CFS. The CFS patients I see are remarkably undepressed, especially given their circumstances! See BRAIN IN CFS – EDGE EFFECT.

A CFS patient is burnt out - usually by overstressing him/herself with work, sport, family commitments combined with insufficient rest, poor quality food, allergies, acute or chronic infections, excessive alcohol/smoking/sugar, chemical overload etc. He/she has lost the ability to produce stress hormones and is stuck in first gear. Increasing stress (accelerator pedal) simply makes the engine scream without going faster. Furthermore the patient often does not sleep well and this compounds the problem. I could stock a good Olympic team with CFS sufferers - top athletes stress themselves hugely and put themselves at greater risk of getting CFS.

With any illness there is a psychological component, but with CFS this is secondary to a physical illness. I am always amazed how well adjusted are my CFS patients and depression is not a common feature. The difference is that CFSs want to do things, but if they do they feel ill. They also tend to wake late. With depression, patients don't want to do anything, but if you push them to exercise, they actually feel better. Usually they have early morning wakening. I suspect this is why the "stimulating" antidepressive drugs seem to make CFS worse - they increase the desire without improving the performance and therefore worsen the frustration.

Anxiety – sometimes this is a problem as patients start to get better. When they are so ill they are often housebound. As they recover they lose the confidence to get out into the world again and this stops them from doing things rather than the fatigue. In these situations drugs for anxiety can be very helpful – such as diazepam 2-5mgs. If used on an occasional basis when the sufferer feels she is not going to cope with a potentially threatening situation just “to take the edge off things” there is no risk of addiction. The drug allows the sufferer to cope with the situation and so gain confidence in their ability to do this in the future. With time and growing confidence the need for diazepam lessens. I have one patient who used about 30 tablets a year – just the knowledge that she can use them should she feel the need is enough to allow her to cope with most situations – the human equivalent of an escape lane! Remember much anxiety is often caused by HYPOGLYCAEMIA.

Rec Reading: Hans Selye "The Stress Of Life", McGraw-Hill Book Co, first published 1956, ISBN 0-07-056212-1



The Plastic Rose Syndrome! Learned symptoms

A man walks into an allergy clinic complaining of allergy to roses. The doctor puts a plastic rose under his nose. The man sneezes. Is this a psychological or physical reaction? It is both. The new buzz word to explain this is "psycho-neuro-immunology" (of the mind, the physical brain and the immune system).

If you take a rat and scratch his skin, then rub in bacteria, he will develop inflammation. If you repeat this daily, he will develop inflammation every day. After several weeks of this, you just scratch the skin, but don't rub in bacteria. The rat will develop inflammation *just as if bacteria had been rubbed in*. The immune system has learned to expect bacteria and reacted appropriately.

The cells of the immune system are very similar to brain cells. They use similar neurotransmitters and are responsive to hormones. They can plug in to the nervous system at numerous sites in the body. They are intelligent, can recognise foreign substances and make decisions about whether or not to attack such foreign substances, and/or call in help from other cells. Indeed they can be thought of as brain cells which are not confined to the brain, but wander all over the body.

The first two examples above show us how these 'mobile brain cells' can be taught in exactly the same way as 'fixed brain cells'. Clearly there must be channels of communication between our fixed brain cells and our mobile brain cells (ie the immune system). The question is, how can we communicate with our own immune cells when they start to go wrong? This is very important for CFS sufferers in particular, because it seems likely that CFS is, at least partly, a disorder of the immune system.

Unfortunately our immune cells don't appear to understand English! However we can communicate with our subconscious using "the mind's eye". *To make changes we have to positively visualise, imagine and believe that changes can be made*, and the brain will sort out for itself how to go about effecting these changes.

One example of how the brain works is illustrated by a group of students who, in 1953 were asked to write down their 'goals and ambitions' in life. Only 3% had positive goals they wanted to achieve. When followed up 20 years later, that 3% were earning more money than all the rest put together. That 3% had a clear idea in their mind's eye what they wanted to do and where they were going, believed they could do it (with the confidence of youth), and achieved their goals.

Getting people better from CFS is like solving a jigsaw puzzle. All the right pieces have to be in the right place at the same time. It may well be that we don't know all the right pieces. However the 'will' to improve is a crucial part. I firmly believe that we all have an ability within us to help ourselves get better - we have to 'tap in' to this resource.

Not only must one have the will (and a feature of CFS seems to be plenty of will!), but this desire must be:

1. Clearly communicated at the subconscious level (talking to your subconscious).
2. There must be no blocks to this message getting through (identifying the blocks).

Talking To Your Subconscious

One effective way seems to be positive visualisation. In this technique, you have to imagine how you want yourself to be, using small, realistic steps at a time. For example initially you have to imagine yourself waking up and feeling good, enjoying the feeling of walking and moving, reading or writing without fatigue, noticing the little things which are happening and interpreting them as signs of improvement. The subconscious does not seem to respond to negative images. i.e it is no good

thinking "I don't want to be ill". You have to have a positive idea in your mind as to how you wish to be. If you can think this sufficiently strongly, the message will eventually get through to the subconscious and the immune system and this will act to get you better. The more clear the message and the longer it lasts, the more effective it will be. Everybody has to work out their own particular message. This may change with time as you have new ideas and improve and need another image of yourself. Keep telling yourself how good you are.

Identifying The Blocks

Some people clearly want to get better, but there is some deep seated reason, some unresolved psychological "pain" which is blocking possible improvement. Very often these patients don't know themselves they have a block about getting better, and it make take a great deal of thought and honesty with themselves to identify 'blocking factors'. For example once patients become ill and unable to care for themselves, they lose a certain amount of responsibility for their own lives. The thought of having to take responsibility again and the worry of not being 'reliably well' may provide a subconscious block to improvement. Psychologically they cannot afford to get better. These people can be thought of as having a 'psychological disability' which is just as disabling and difficult to deal with as any physical disability.

A common psychological pain is for a person not to feel loved. Until the reason for that lack of love can be worked through psychologically through understanding how the situation arose in the first place, he/she will never be able to change to a "from now on I will feel loved" position.

Making Changes

Our personal identity is very important to us. We have certain traits and personalities which we are resistant to changing. For example a naturally jolly person is expected to be jolly by other people and is a cause for comment if he is grumpy. It is difficult for him to change to a grumpy person. Similarly the reverse is true. Mr Scrooge made the change and it is cause for comment every Christmas! But it must have been very hard for him - much easier to remain grumpy.

Beliefs

Unless you believe deep down you can make the change, you never will. The best form of encouragement is positive feedback. If you see yourself getting better, you will think more positively and improve further. See every little change as a sign of improvement.

How To Find Help

One of the big problems for CFS sufferers is money - often they simply do not have the financial resources to pay for help. However professional psychological help could prove a good investment. Even an occasional consultation may put you on the right lines to help yourself further. Choose your therapist carefully - for example it is no good having somebody who does not believe CFS exists! Psychotherapy is partly about communicating with the subconscious. Hypnotherapy seems to bypass the conscious mind with all its blocks and inhibitions and 'plug in' directly to the subconscious mind.

Further reading:

Love, Medicine and Miracles - Bernie Siegel

You Can Heal Your Life - Louise Hay

Quantum Healing - Deepak Chopra (and others by him)

ME and the Healer Within - Nick Bamforth

Climbing Out of the Pit of Life - Dr Darrel Ho-Yen. Cost £10, cheques to Dodona Books, from The Old Schoolhouse, Kirkhill, Inverness, IV5 7PE.

RG (who recommends the above books) goes on to say "Finally this talking to the subconscious/unconscious can be taken to extreme. We could become desperate searching for the right technique to get the message across to our damned, stupid, stubborn unconscious! Whilst I feel it can be productive telling our unconscious what to do, I think we should also be listening to it. If we listen more, perhaps we will learn what is wrong with our bodies or our lifestyle. I believe we have enormous inner wisdom that we need to contact if we are to be truly happy and healthy. Using various techniques, we need to dig deeper and deeper, to connect with the unconscious, to connect with that inner wisdom. Sometimes that inner wisdom reveals what is wrong inside our bodies. Where our inner wisdom is far more useful in my view is in revealing what is wrong in our minds, in our hearts or spirits, what is wrong with the way we live and love."

He also gives the following recommendations about finding a therapist.

1. Find someone who has been personally recommended by someone whose opinion you value. OR ask a 'professional carer' such as a GP, community psychiatric nurse (NHS CPNs can be contacted through your local Special Needs Services, see yellow pages) or your local vicar for a recommendation.
2. Whoever you see, try to have an initial consultation with your therapist to see if you are both "compatible" ie you get on well, you are clear what therapy entails, how long sessions last, how long is a course of treatment, cost etc.
3. Discuss with the therapist if you are not happy about therapy at any stage and, if necessary go elsewhere.

Heather Sharpe sums it up: Accept ~ Adjust ~ Achieve.



Exercise - the right sort in CFS

My view is that CFSs are on the same energy spectrum, but the opposite end, to elite athletes. The processes and principles for improving energy efficiency apply equally to both. See EXERCISE – THE RIGHT SORT on the website or ask for a copy from the office.

In CFS the first step is to put in place all the necessary dietary, nutritional and detox mechanisms so that your mitochondria are working efficiently. At this point clinically you should be feeling absolutely fine doing absolutely nothing. Until this point is achieved one dare not exercise because this will just cause massive tissue damage! Indeed, we already know this – CFS is characterised by running a high cell free DNA which is a measure of tissue damage. See p. **28**

However, once you feel absolutely fine doing very little and your mitochondrial tests, cell free DNA and antioxidant status are all improved (ideally normalised), together with any other problems that you know about, then the principles of a graded exercise regime should be as per EXERCISE – THE RIGHT SORT and EXERCISES – THE BIG FOUR WHICH TAKE 12 MINUTES TO DO!

These exercises are about increasing the numbers of mitochondria. This is equivalent to upgrading your car from a 500cc Deux Cheveaux to a 4 litre Rolls Royce! So first you have to get your mitochondria working well, then you need to increase their numbers.

PART VI: TOXIC AND VIRAL CAUSES OF CFS

such as Organophosphate poisoning, GULF WAR SYNDROME, AEROTOXIC SYNDROME, 9/11 SYNDROME (FIREMEN), silicone POISONING, carbon monoxide poisoning, HEAVY METAL POISONING SUCH AS mercury FROM DENTAL AMALGAM, and others



You won't see the problem unless you look for it!

Chemical poisoning

Chemical poisoning is good at triggering a chronic fatigue syndrome. Clinically, a chemically induced CFS looks just like a virally induced CFS. One difference is multiple chemical sensitivity (MCS), in which exposure to chemicals which smell (aerosols, air fresheners, perfumes, vehicle fumes etc) results in unpleasant symptoms. MCS is triggered by chemical toxicity. Where there is poisoning there is sensitivity and vice versa. This simply reflects the ability of the immune system to “remember” things. With a virus, the immune system “remembers” and we call it immunity. With MCS the immune system “remembers” the poisoning and reacts again when it “sees” the chemical, or a relative of that chemical.

The sort of activities and events which result in chemical exposure include:

Pesticides

- sheep dipping,
- spraying agricultural chemicals (farming, market gardening),
- being sprayed by tractor or helicopter and spray drift (adjacent homes),
- insect control “squeeta betas”,
- contamination of water supplies,
- working in a chicken farm (fumigation, control of parasites),
- working in the sea of factory farmed salmon in Scotland (where chemicals are used to control fish lice),
- repeated head lice treatments,
- house fumigations for flea control or bed bugs,
- insect control in hot countries with DDT, OPs etc,
- control of sand flies (Gulf War Syndrome),

- greenhouse fumigations,
- working in a research plant centre where chemicals were weekly used to prevent cross contamination,
- ‘A’ level student doing a biology project with pesticides,
- carpet factory where fleeces are washed after sheep have been dipped,
- lorry driver delivering OPs to farmers,
- Government Inspectors in sheep markets,
- dairy farmers daily exposed to OPs for fly control in the milking parlour,
- poisoning through exposure to dumped cans of sheep dip,
- welders working in a factory which was manufacturing OPs,
- timber treatments in houses,
- treatment of external parasites in dogs, cats, cows (OP pour ons) and so on,
- firefighters poisoned by burning chemicals,
- formaldehyde leaking from cavity wall insulation
- flower industry (lots of chemicals on flowers),
- timber treatments and handling treated timbers,
- airline pilots exposed to organophosphates used in engine oils (which allow oils to work at high temperatures) see www.aerotoxic.org
- cabin staff on airplanes using pesticides to prevent inadvertent import of foreign insects,
- DDT used to treat infestations (possibly misdiagnosed as polio).

Volatile Organic Compounds (VOCs)

- Poisoning from un-burnt hydrocarbons such as oil, gas, coal and wood. Free standing gas heaters are a particular hazard! These poisonings goes under the misnomer carbon monoxide poisoning. Actually the carbon monoxide is just a small part of the problem – yes – this certainly causes acute symptoms, but the long term poisoning arises from the toxic VOCs from unburnt hydrocarbons!
- Aerotoxic syndrome – this arises because cabin air is pulled in over the engines and possibly contaminated with unburnt fuel and organophosphates used as oil improvers. See www.aerotoxic.com
- Vehicle exhaust fumes
- Solvents used in carpets – new carpets are particularly pernicious! This together with poor ventilation is probably the main cause of sick building syndrome.
- Paints
- Glues
- Printing inks
- Cleaning agents - bleach
- Disinfectants – these often include formaldehyde or other such related compounds.
- Sterilising agents – “Milton”
- Perfumes
- Cosmetics – many are toxic especially hair dyes

Heavy metals

- Mercury from dental amalgam is the biggest single problem!
- Nickel we often see blocking biological enzymes (from stainless steel saucepans, jewelry)
- Vaccinations are a particularly pernicious mixture of heavy metals with viral/bacterial particles and are good at triggering CFS
- Lead, cadmium antimony, arsenic
- Depleted uranium in the Gulf War Veterans

Prescription Drugs

Many prescription drugs inhibiting mitochondria directly – the best example are beta blockers – nearly all my CFS patients are made worse by these.

Statins I particularly hate. They inhibit the body's own production of co enzyme Q 10 – the most important anti-oxidant in mitochondria.

Many drugs are metabolised in the liver and this imposes extra strains on liver detox, so for example many CFS sufferers are made ill by “normal” doses of antidepressants.

Chemicals created or released from within the body

From immune activity – the way that the immune system kills bugs is by shooting free radicals at them. These free radicals have to be mopped up by a good anti-oxidant system otherwise the body is damaged by “friendly fire”. Free radicals damage mitochondria. Indeed it is possible this is the mechanism by which viruses switch on chronic fatigue syndromes.

From gut fermentation – food should be digested. In CFSs we often see a fermenting gut. This produces toxins such as alcohols, right handed sugars (eg D-lactate), noxious gases (eg hydrogen sulphide) all of which have to be detoxified in the liver. If liver detox is impaired, these toxins spill over and poison, amongst other things, mitochondria.

Neurotransmitters and hormones – many have to be detoxified in the liver with a view to recycling. When we do detoxification regimes! In the short term, the body can “hide” toxins by dumping them in fat. As we detox we mobilise these into the blood stream and this causes acute poisoning. Levels in fat are 100-1,000 times higher than those in blood.

Social toxins

- Alcohol – this is consumed in gram amounts and places a heavy burden on the liver. Most CFSs do not tolerate alcohol and this probably reflects the fact that their liver detox is already overwhelmed by the above factors.
- Artificial sweeteners can be particularly toxic. Aspartame for example is broken down in the liver to formaldehyde – a known neurotoxin.
- Nicotine
- Caffeine

The above chemicals are known as persistent organic pollutants or POPs.

Silicone

This is in a league of its own. With silicone I am not just looking for the obvious breast implant or silicone injections - many other prostheses have biologically active materials. Examples include testicular implants, lens implants, Norplant contraceptive device (silicone rods), TMJ work, facial contouring, meshes for hernia repairs etc. In the veterinary world reactions to suture materials are well documented – not so in the medical world.

Silicone itself is pretty inert. The trouble is that it “out-gasses” from implants, is picked up by the white cells and spreads into the rest of the body. In susceptible people it acts as an immune adjuvant and switches on the immune system causing widespread inflammation wherever it ends up. It cannot be stripped out by the usual detoxification techniques.

IN PRACTICE IT IS OFTEN A COMBINATION OF THE ABOVE TOXINS AND/OR VIRAL STRESSES WHICH TIP THE BALANCE AND TRIGGER THE CFS

How do chemicals damage the body?

- By overwhelming the liver's P450 detox system causing a release of pro-inflammatory free radicals which inhibit mitochondria and mess up cell metabolism generally.
- By inhibiting mitochondria directly. For example organophosphates inhibit oxidative phosphorylation for obvious biochemical reasons.
- Blocking translocator protein function so ATP and ADP cannot be moved in and out of mitochondria
- Sticking onto DNA so genes cannot be used to make new molecules
- Sticking on to DNA, interfering with growth control mechanisms and switching on cancers.
- Sticking on to DNA to cause birth defects
- By mimicking body hormones and neurotransmitters. Organochlorines are oestrogen mimics and cause gender bending, breast cancer and birth defects.
- By blocking the action of hormones and neurotransmitters. So for example we know that persistent organic pollutants (POPs) cause insulin resistance and contribute to our current epidemic of hypoglycaemia and diabetes.
- By interfering with communication between normal immune cells so switching on allergy and autoimmunity.
- Heavy metals "mimic" essential trace elements and replace them in enzyme systems which then malfunctions. Nickel for example may displace zinc. This situation is made worse where there is zinc deficiency.
- Sticking onto proteins and distorting them - indeed there is evidence that many prion disorders result from poisoning with heavy metals and pesticides. Prion disorders include Alzheimer's disease, Parkinson's disease, motor neurone disease and CJD.
- By interfering with normal healing and repair – we know organophosphates cause osteoporosis, as does heavy metal poisoning.
- And many other possibilities as yet unidentified!

Therefore chemicals are implicated in many diseases of "civilised" Man who eats modern diets and live with 21st century technology!

The clinical picture of chemical poisoning

If there is acute poisoning there may be acute symptoms such as streaming eyes, nose, cough, wheeze, vomiting, diarrhoea, sweating – all attempts by the body to get rid of the toxin. In severe cases, loss of consciousness and death.

In moderate poisoning – some of the above symptoms followed by a flu like illness which may persist for days.

In chronic "low dose" poisoning, chronic fatigue syndrome develops as mitochondria go slow.

In the long term, there is an acceleration of the normal ageing process and sufferers get diseases before their time and die prematurely. Poisoning is like throwing a handful of sand in a finely tuned engine!

Clinically we see

- Chronic fatigue syndrome because of mitochondrial failure
- Organ failures (such as low cardiac output resulting in POTS) secondary to mitochondrial failure
- Hormone resistance with increased risk of diabetes (insulin resistance)
- Damage to the heart – particularly the electrical conduction system producing dysrhythmias
- Damage to nerves – Central nervous system (psychological problems, psychiatric, sleep, brain fog etc) autonomic nervous system (sweating, temperature control, hyperventilation, etc) and peripheral nervous system (numbness, tingling etc).

- Gut damage – poor digestive function
- Damage to muscles – stiff muscles and painful muscles
- Damage to bones – osteoporosis
- Damage to the immune system – allergies, autoimmune disorders and multiple chemical sensitivity. Tests often show immune damage.
- Damage to the endocrine system – abnormalities of the hypothalamic-pituitary-adrenal axis, thyroid damage, adrenal fatigue, sex hormones low with loss of libido
- Probable damage to the liver
- Cancer, birth defects (damage to the unborn baby), and damage to sperm causing low sperm counts and infertility.
- Increase in prion disorders

How to test for chemicals

Most of the below are available thanks to the skill of John McLaren Howard working at Acumen.

Fat biopsy for pesticide and volatile organic compounds – this is a very easy test – one just has to push a hollow needle (as used for taking blood) into the fat and the amount contained within the bore is sufficient.

ATP studies – tell us if oxidative phosphorylation and translocator protein are blocked (in addition to other information)

Mito-respirometry studies – a closer look at oxidative phosphorylation – it could be uncoupled by chemicals so energy demand does not match energy supply and mitochondria work very inefficiently.

Translocator protein function – looks at what is stuck onto mitochondrial membranes

Gene studies – part of the testing for SODase looks to see if the genes coding for SODase are blocked,

DNA adducts – looks at how such chemicals and/or heavy metals have stuck to DNA.

Levels of toxic metals can be measured in blood or sweat. Hair analysis not very reliable.

Kelmer test – measures heavy metals in urine before and after a chelating agent

Lymphocyte sensitivity tests – these look at whether white cells have been sensitised to particular chemicals. This occurs when they have been poisoned and represents immune memory of such a poisoning. Thus chemical sensitivity and poisoning are found together. These tests can be done for almost any substance.

Gut fermentation tests – look for alcohols, D lactate, hydrogen sulphide ie abnormal chemicals from the gut.

Principles of treatment of chemical poisoning and MCS

In order of priority:

AVOID further exposures of the offending chemical

REDUCE LOAD – of all chemicals

IMPROVE NUTRITIONAL STATUS – so the body copes better with chemicals

DETOXIFICATION by as many different methods that can be done. My preference is for FIR saunaing.

DESENSITISATION

Also see handouts: CHEMICAL POISONING – GENERAL PRINCIPLES - DIAGNOSIS, INVESTIGATION and TREATMENT, MULTIPLE CHEMICAL SENSITIVITY and CHEMICAL POISONING - TREATMENT, DETOXIFICATION, EPD - ENZYME POTENTIATED DESENSITISATION. ORGANOPHOSPHATE POISONING, AEROTOXIC SYNDROME, GULF WAR SYNDROME, DENTAL AMALGAM AND MERCURY TOXICITY.

What can you expect from your GP?

The problem with GPs is that they are not trained to look for toxicological (poisoning) as a cause of illness. You may be referred to the Poisons Units (now called Medical Toxicology Units). The Poisons units have not made a single diagnosis of chronic organophosphate poisoning in the last ten years, I suspect because funding for the Poisons Units comes from the chemical companies. This is an issue I have written about in the Journal of Nutritional and Environmental Medicine, which the Poisons Units have failed to refute.

You can expect your GP to do a series of blood tests and tell you there is nothing abnormal and therefore nothing wrong. The next step might be referral to a neurologist, who again will trot out the party line – “chronic chemical poisoning does not exist”. The next port of call is usually the psychiatrists who do not have a “toxicological” diagnostic pigeonhole and will squeeze you into the next nearest fit, ie chronic depression. The treatment of this, namely anti-depressants, will make the poor sufferer, worse, he will refuse to take them and be discharged as an uncooperative patient. The OP afflicted farmer is left to sort out his life as best as he can and usually ends up with declining health, having to sell his farm or rent out his fields. His marriage usually founders because he can't pull his weight. No wonder that a significant proportion commit suicide.

Fortunately most people are intelligent and realise the above state of affairs. But the lack of street credibility and help from Government Agencies make chronic chemical poisoning a social and financial disaster area.



Chronic infections in CFS

Whilst there is no doubt that an acute infection is a common trigger for CFS, the question is: to what extent does chronic infection perpetuate the fatigue? I have struggled with this question for years! There is a body of evidence pointing to chronic infections such as Lyme disease, borreliosis, mycoplasma, HHV, Epstein Barr, cytomegalovirus etc. present in CFS patients together with various trials showing benefits from anti-microbials. The trouble is the diagnosis is difficult, the treatments often expensive and all carry potential for harm from toxic drugs.

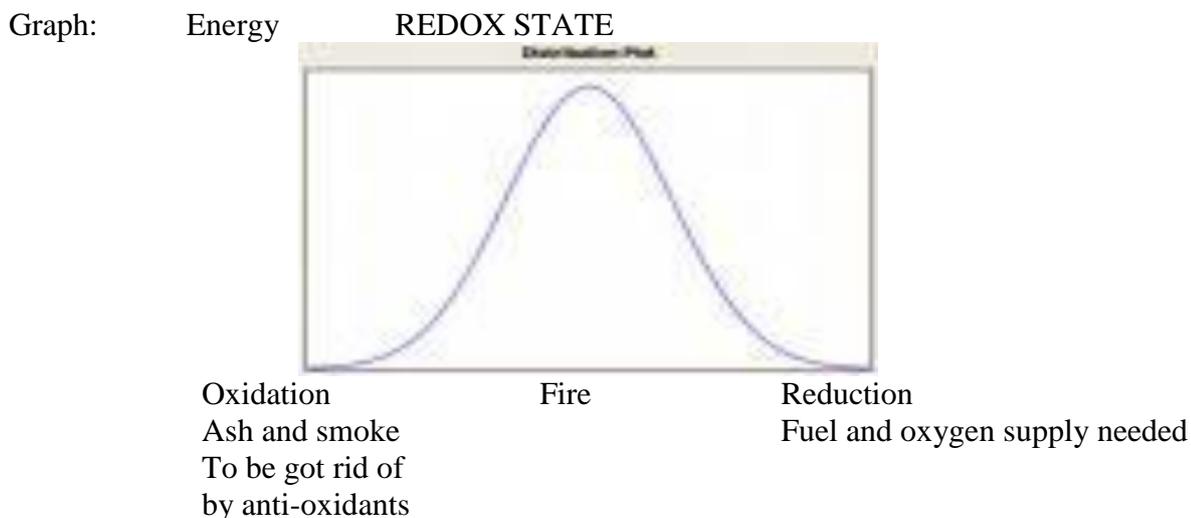
We are all exposed to infections, but only a few get chronic problems. The difference has to do with individual susceptibility – as Pasteur famously said “*The microbe is nothing, the terrain is everything*”.

What is central to CFS is mitochondrial function. I believe this will be the most important marker of CFS and testing mitochondrial function often points to nutritional deficiencies or toxic blockages which, when corrected, in many case result in clinical improvement. However, Dr Paul Cheney believes that one's redox state is also central in the control of mitochondria. See CHENEY ON CFS MECHANISMS, also FERMENTATION IN GUT, FREE RADICALS and CFS.

What is the redox state?

Think of redox state as a fire. For the fire (mitochondria) to burn brightly we need optimum conditions of fuel, oxygen and the molecular machinery to handle this. If the fuel supply is sluggish, the fire burns low. If the oxygen supply is sluggish, the fire burns smokey (free radicals). Getting the right balance between fuel, oxygen and the molecular machine (magnesium, coenzyme Q 10, acetyl L carnitine, magnesium D-ribose, NADH etc) together with adequate antioxidant cover to mop up smoke (superoxide dismutase, co-enzyme Q 10, glutathione peroxidase, vitamins A,E and C etc) is necessary for the efficient use of energy.

The graph below illustrates this. To have adequate supply of energy, the redox state must be central. At this level, the fire is burning brightly; we have a good balance of supply of fuel and oxygen on the one hand, with good antioxidant cover on the other to carry the smoke (free radicals) away.



If one falls to the right side, the fire burns low because we do not have the raw materials to feed it so energy levels are low. One would see this in starvation, or chronic poor oxygen supply from lung disease or anaemia.

If one falls to the left side, there is too much free radical production, which overwhelms the antioxidant mopping up system. The free radicals then inhibit mitochondrial function directly and the fire burns low and again we see low levels of energy.

There is a further complication. Mitochondria have to adjust the level of their fire from second to second so that energy supply is coupled to energy demands. Mitochondria need to supply energy at a millisecond's notice! In the micro-respirometry studies that John McLaren-Howard does, we often see uncoupling of oxidative phosphorylation so this link is lost and energy is wasted.

Why is this important?

Using his methods of assessing heart function (also a measure of mitochondrial function), Dr Cheney has shown that CFS sufferers respond to oxygen very differently from healthy controls. People with normal energy levels who function in the middle of this redox state perform better with additional oxygen. Their fire glows brighter! In contrast, CFS sufferers get worse. Cheney postulates that this is because they are sitting to the left side – with low levels of energy and poor anti-oxidant status. They cannot cope with free radicals which are already making their mitochondria go slow. Give them oxygen and this creates further pro-oxidant stress which worsens the situation by pushing

them further to the left. Indeed, this is how he distinguishes experimentally between people with CFS and normals.

Why is this relevant to viral infection?

A paper published in 1991 by Fauci looked at the ability of viruses to replicate according to redox status of the host. What was so fascinating about this paper is that in those individuals with normal redox status viruses were unable to replicate and so their hosts were markedly resistant to viral infection. This explains why when we see an epidemic of infectious disease such as influenza, not all people are equally affected. Some have no symptoms, whereas others are completely flattened. In those people with poor redox state, the virus was able to replicate easily and it is high numbers of viruses in a human host which dictate the severity of the illness. Furthermore, if the immune system moves into “overdrive”, one can get a “cytokine storm” resulting in massive tissue damage and possible death. Indeed, this is what kills people in flu epidemics.

So, if one gets an acute viral infection, and one cannot drag oneself back from the left pro-oxidation side into a normal redox state, one will be stuck with low levels of energy because the mitochondria cannot work. A recent article in the New Scientist (29.8.09) shows that some viruses generate oxygen. If this were the case, it could partly explain how viruses keep one in this pro-oxidant state. The virus has manipulated the host’s biochemistry to suit itself and allow it to multiply!

So how does one get rid of a chronic infection?

The majority of people I see improve without resorting to anti-microbials by putting in place all the interventions to restore mitochondrial function and good anti-oxidant status. These include:

- STONEAGE DIET
- NUTRITIONAL SUPPLEMENTS
- SLEEP
- PACING
- Correcting MITOCHONDRIAL FUNCTION
- Correcting ANTI-OXIDANT status
- DETOX regimes
- Etc

However, Cheney has seen good results by treating CFS sufferers using artesunate. This is derived from the Chinese herb artemesia. It is of proven benefit in treating malaria. But, interestingly, it is active against a wide range of other infections including schistosomiasis, cytomegalovirus, hepatitis B, Human Herpes Virus simplex type 1, Human Herpes Virus type 6, hepatitis C, Epstein Barr virus, bovine viral diarrhea virus and probably others. Artemesins have also been shown to be effective against bacterial infections, yeast infections and also they have powerful anti-cancer activity. What is most remarkable is that side-effects are minimal and rare.

This begs the question as to how one drug can have such a broad spectrum of activity against so many different pathogens? The answer is that it has an effect on the redox state of the host – it pushes it back to the right. It creates a terrain in which bugs cannot replicate! In a normal redox state mitochondria can work normally, energy levels are restored, the body warms up (many pathogens are markedly heat sensitive- that is why we run a fever to get rid of bugs) and the immune system has the energy to kill infection. **BUT THIS WILL ONLY WORK IF ALL OTHER INTERVENTIONS ARE IN PLACE. Without normal mitochondrial function, normal antioxidant status, etc. artemesins cannot work!**

Using Artesunate

The dose is 2-4mgs per kg body weight daily given by mouth in two doses. I would suggest 100-200mgs twice daily for one week, then go to a maintenance dose of 100-200mgs alternate days, gradually tailing off until there is clinical improvement and stability.

Side effects are remarkably few – see below:

Possible side effects: Artemether has been remarkably well-tolerated, and appears less toxic than quinine or chloroquine; adverse effects include bradycardia, electrocardiogram abnormalities, gastrointestinal disturbances (nausea, abdominal pain, diarrhoea - oral therapy only), dizziness, injection site pain, skin reactions, and fever. Transient decreases in neutrophils and reticulocytes have been reported in some patients treated with artemether.

Drug induced fever has been observed with artemether. Mild reactions were seen in patients to whom artemether had been administered intramuscularly. These included nausea, hypotension, dizziness and tinnitus. These side effects were also reported: dark urine, sweating, somnolence, and jaundice. There were no deaths or any other side effects. No irreversible side effects were seen.

Slight rise of SGOT and SGPT may occur in individual cases. Neurological side effects have not yet been observed in clinical use but clinical trials suggest that coma may be prolonged in patients treated with artemether and there was an increased incidence of convulsions in one trial in cerebral malaria. Transient first degree heart block has been documented in three patients receiving artemether.

Neurotoxicity has been observed in animal studies but not in humans.

Cardiotoxicity has been observed following administration of high doses of Artemether.

Using artesunate in CFS is still experimental although Cheney has reported some good results. I cannot emphasise enough how important it is to put in place all the other interventions – artesunate is the icing on the cake! No cake and the icing does not work!

PART VII: THE PRACTICAL DETAILS – WHAT TO DO FIRST AND WHERE TO GET MORE HELP



In practice I treat CFS patients in the following order, starting with the things that everyone should do all the time then add on the extras if they do not recover with this simple package of treatment.

The order of importance!

Practically speaking (instead of logically speaking) this is the chronological order of recovery:

Observe seven fundamental rules

This applies to all CFS sufferers – most people “cherry pick” and do the easy things. I spend more time talking about diet and sleep than all other issues put together. This is because these are the two most important factors to put right for recovery.

REST - 80% rule, pacing, mental and physical rest. Get organised. Accept help. Arrange for deliveries to house. Delegate work. Prioritise. List the 10 most important things in your life, then ignore the last five. You can't do everything. Look after your mitochondria!

NUTRITIONAL SUPPLEMENTS - it takes at least 6 months for body stores to replete. Supplements are for life.

YOU MUST SLEEP - quality sleep is essential to life. Don't be afraid to use tablets to restore the normal day/night diurnal rhythm.

STONEAGE DIET - Humans evolved over thousands of years eating a Stoneage diet. We should all move towards eating such a diet made up of foods of low glycaemic index which avoids the common allergens (grains, dairy, yeast, artificial food additives). I now also recommend routine use of **DIY PROBIOTICS** such as **KEFIR**.

TREAT THE MITOCHONDRIAL METABOLIC DYSLEXIA which may include some of the following:

1. Correcting levels of
 - D-ribose
 - Antioxidants (Co-enzyme Q10, Acetyl-L-carnitine, B12, glutathione)
 - Magnesium (injections)
 - Niacinamide
2. Detoxing
3. Tackling hormonal imbalances
4. Tackling hyperventilation

DETOX – reduce your chemical load by:

- Avoiding alcohol, care with caffeine, many prescription drugs (especially statins, diuretics, beta blockers, antidepressants, Pill and HRT) make CFS much worse. We now know why – they inhibit mitochondria. Don't take the Pill or HRT – they worsen CFS in the long term and certainly predispose to getting CFS because they suppress the immune system and induce nutritional deficiencies. Many IUCDs (coils) also contain hormones. Depot injections are the worst! Fertility treatments often disastrous for CFS.
CHEMICAL POISONING AND MCS – HOW TO REDUCE YOUR BODY LOAD
- Do a good chemical clean up of your environment – throw out all the smellies in your house, keep the house well ventilated, avoid sprays, polishes, aerosols, new paints, new carpets, gas cookers and heaters etc. **CHEMICAL POISONING AND MCS – HOW TO REDUCE YOUR DAILY EXPOSURE**
- Consider detoxing with a “sweating regime” such as FIR. These gets rid of all toxins – heavy metals, pesticides and volatile organic compounds but it is important to rehydrate with beneficial minerals since these too are lost in sweat. Actually it is not essential to sweat for FIR to be effective – fat soluble toxins are mobilised onto the lipid layer of the skin and then can be washed off. There are many ways which one can detox – see DETOXIFICATION.

AVOID INFECTIONS whenever possible

- Do not permit visitors who have a cold!
- Improve nutritional status – especially vitamins D and C.
- Check for HYPOCHLORHYDRIA
- At the first sign of a cough, cold or sore throat use high dose micronutrient such as vitamin A (not if pregnant), vitamin C, zinc, selenium and propolis. Don't be afraid to take high dose vitamin C to bowel tolerance – if you take too much the worst that can happen is diarrhoea. I need 10-20 grams in 2 hours to stop a cold. You may need more. With infections your need and your tolerance of vitamin C increases markedly.
- Also use the neutral form of vitamin C (eg magnesium ascorbate) to dissolve in the mouth to kill microbes in there.
- Consider heat and sweating to get rid of viruses – they are quite temperature sensitive!

Allow time for recovery

FIRST GET THE REGIME TIGHT. THEN FEEL WELL DOING VERY LITTLE. THEN GRADUALLY INCREASE ACTIVITY SO LONG AS YOU CONTINUE TO FEEL WELL (by which I mean no loss of stamina or delayed fatigue). Feeling ill results from useless inflammation in the body causing a high cell-free DNA which has the potential to switch on allergies and/or autoimmunity. Feeling ill can make you more ill, it is a disease amplifying process.

If after doing the above you are not better, move on to:

Do the other things which address the mitochondrial dysfunction such as B12 injections, magnesium injections/nebuliser, etc. Do as many of these things at the same time as you can. By the time you have been ill for several years, more than one thing will be wrong – you need to tackle them all at the same time to see improvement. The priority is to get well. Once you are better, these things can be knocked off, (ie the regime can be relaxed), one at a time to find out which is important. In order of importance:

1. **ANTIOXIDANT STATUS.** The cell-free DNA (part of the mitochondrial testing) is a measure of damage to cells which may be caused by poor antioxidant status. The important antioxidants to consider are:

- Superoxide dismutase (there are two forms – one dependent on zinc/copper, one on manganese),
- Co enzyme Q10 (most important inside mitochondria) and glutathione peroxidase. These are routinely measured as part of the mitochondrial function testing.

If these levels are poor then it is well worth using B12 by injection. B12 works well clinically because it instantly improves anti-oxidant status and takes over the function of some of the other antioxidants which may be failing. Don't waste money measuring B12 levels – that is irrelevant – it is the response to injections which is important. I like to see people running blood levels above 2,000. Make sure you are on a multivitamin containing folic acid when you have injections. There are many other molecules which also have antioxidant function such as:

- NAD levels (part of CFS profile)
- Acetyl L carnitine
- Melatonin (another reason to get a good night's sleep!)
- High dose vitamin C helps to recycle all the above antioxidants. Our physiological requirements are probably for 2-4grams daily.

Many foods contain natural antioxidants such as vegetables, nuts and seeds – tuck in! See also **ANTIOXIDANTS**

2. **COMMON HORMONAL PROBLEMS:**

- Underactive thyroid
- Adrenal gland insufficiency (DHEA and cortisol)
- Human Growth Hormone

3. **FOOD ALLERGIES** – if, despite doing the Stone Age diet, you still have a long symptom list you are likely to be multiply allergic. Consider either a single food meal diet (such as five meals a day made up of single foods) or even a rotation diet or a rare foods diet (chose 10 foods rarely consumed and eat nothing but for two weeks). About one in ten patients who see me with CFS end up needing desensitisation for multiple allergies. Indeed it is allergy which most commonly messes things up because sufferers do not tolerate the interventions necessary to get well. See **ENZYME POTENTIATED DESENSITISATION**.

Tests for food allergies are notoriously unreliable and at present there are no particular tests that I would recommend. The only reliable test is neutralisation/provocation – see www.ecomed.org.uk for practitioners.

4. **GUT PROBLEMS** – are usually caused by **ALLERGIES** and **HYPOGLYCAEMIA**, **GUT DYSBIOSIS** and/or **HYPOCHLORHYDRIA** and **POOR PANCREATIC FUNCTION**. Also see **MALABSORPTION**, **GUT DYSBIOSIS** (wrong bugs in the gut), **FERMENTATION IN THE GUT**. Getting gut symptoms right is central to getting the CFS right. Consider:

- fungal type dysbiosis (candida), see YEAST PROBLEMS
- bacterial type gut dysbiosis, helicobacter pylori,
- gut parasites (eg symptoms following travel abroad).

Or a combination of these three.

5. **HYPERVENTILATION** can cause fatigue. This is often overlooked. Indeed, it is almost an inevitable part of CFS that one ends up with a hyperventilation problem. By night hyperventilation causes vivid dreams and non-restorative sleep. It is often driven by hypoglycaemia, food intolerance, gut dysbiosis, low magnesium levels and stress. Can certainly be helped by breathing retraining.

6. **AUTOMMUNE PROBLEMS.** One of the risks of running a high cell-free DNA is that the cellular debris swilling around in the blood stream may switch on an antibody response. If you are unlucky this could result in autoimmunity because by chance, the antibodies against the cellular debris cross react with one's own tissues. This is a good reason to feel well – feeling ill (malaise) is caused by high cell-free DNA and may switch on allergy and autoimmunity, i.e. this is a disease amplifying problem – something you can do without! Autoimmunity may also be switched on by leaky gut in which large antigenically interesting molecules leak into the bloodstream where they may induce an antibody response - see **AUTOIMMUNITY**.

7. **PSYCHOLOGICAL ASPECTS OF TREATING CFS.** The personality who gets CFS is the high achieving, workaholic, goal seeking, perfectionist. These people continue to work at the expense of their health. In order to work longer hours and achieve they eat junk food, are natural addicts (sugar, carbohydrates, caffeine, alcohol, nicotine), miss sleep, don't rest when they are tired and don't take time off when they are ill. To recover from CFS they have to let go of this personality – this means making fundamental changes, which are not easy. If they do not let go, once improved, they simply put back all the things which caused them to get CFS is the first place and simply relapse back into CFS.

Most CFS patients are not depressed, just pissed off and frustrated that they cannot do more. The difference between CFS and depression is that in CFS the desire is there but the performance is lacking. In depression there is no desire, but if the depressed sufferer is kicked into exercise they often feel much better for it.

The basis of cognitive behaviour therapy (CBT) is that the patient is “frightened” to exercise because that exercise will make the patient worse and that “fear” has to be addressed. During the acute phase, when the physical causes have not been addressed, the patient is right! The trouble is that they are often not believed by their doctors! This is where the mitochondrial function test is useful because it gives an objective measure of disability either by a poor mitochondrial function score or high cell-free DNA showing cell damage or both. CBT is only relevant in the recovery process once all the underlying physical problems have been addressed and the patient can exercise without becoming ill. At this stage it is not unusual for anxiety to become the rate limiting step – actually the patient can exercise but is so conditioned that he dare not, almost amounting to agoraphobia. This anxiety is often driven further by hyperventilation and hypoglycaemia. Psychotherapy and tranquillisers can sometimes help get over these psychological blocks. Recommending CBT for CFS without addressing the underlying physical disorders is akin to beating up the driver of a car when the car won't go.

Use of anti-depressant medications – can be helpful but because most antidepressants block mitochondrial function, one has to use very small doses and build up gradually.

8. TACKLE TOXIC PROBLEMS – the commonest problems are:

mercury in dental amalgam as a cause of fatigue is not unusual. Test for with a Kelmer test which measures mercury levels in urine before and after taking a chelating agent

pesticide levels – easily tested for by fat biopsy (easier than a blood test)

volatile organic compounds – again fat biopsy

heavy metals – a hair analysis or sweat test can be misleading. Nickel seems to come up very frequently as a problem. There is no one reliable test for heavy metals, but increasingly I do lymphocyte sensitivity tests. Although this measures sensitivity, sensitivity does not come without toxicity, ie sensitivity testing also indicates toxicity.

Other useful tests for toxicity problems:

Mitochondrial function tests often show blockage of translocator proteins which often results from toxic stress. This can now be investigated as a separate test.

DNA adducts – looks to see if chemicals or heavy metals are stuck onto DNA – this is a pre-cancerous condition. This is a very useful test which I often request.

Detoxification screen – looks at how efficiently the liver detoxifies chemicals

9. CHRONIC LOW GRADE INFECTIONS – this is difficult because the tests are not reliable and often one has to resort to a trial of antibiotics. Antibiotics are a two edged sword because of the risk of flaring a yeast problem! Mycoplasma (Lyme disease) may be much more common than is believed but at present I do not know how to diagnose it reliably nor treat it reliably. I have a few patients with a typical history who have responded well to high dose long term doxycycline.

10. PAIN CONTROL – pain, like fatigue, is just a symptom of something going wrong and one should try to work out the cause. The commonest issues are:

General pain: Failure to pace activity properly!

Low pain threshold is a feature of CFS

Muscle pain (limbs, trunk or chest pain) – see new section on muscle pain

Trapped Nerves – think of osteoporosis

Useless inflammations (poor antioxidant status, auto-immunity)

See PAIN, INFLAMMATION, ARTHRITIS, OSTEOPOROSIS, STIFF MUSCLES, ALLERGIC MUSCLES



If despite all of the above you are still stuck!

Whilst people are improving and continuing to improve (either feeling better, or increasing their activity levels) then I would not suggest any further intervention. However, if you get stuck then the first thing to do is to go back to square one and examine objectively how strict your regime is. It is all too easy to get sloppy, relax the diet too much, become undisciplined about sleep, forget to take the supplements, not stick to the pacing rules carefully and stop making progress as a result. It is much more important to do the basic things really well than spend a fortune on the esoterics! Getting better from chronic fatigue syndrome is extremely hard work and takes a huge amount of personal input. However, if you are really stuck at this stage, then this is the point at which you need to consult another doctor.

Indeed, I have come to the stage where I need a band of trained advisors who can help interpret these concepts and test results to the uninitiated! I shall call this band of trained advisors my barefoot

doctors who can help move things on for sufferers and point in which direction to go. See PRACTITIONERS TRAINED TO TREAT CFS, list at end of the book (p. 133)

Think of either multiple allergies or unusual allergies

At this stage I consider the possibility that there is something in your house, or the environment in which you live which is making you ill. The two major players are moulds and chemicals. Ideally, I would put you into an environmental unit which was free from chemicals and moulds, but the last unit in UK (the Airedale Allergy Centre in-patient unit) closed when “fund holding” stopped. The next best thing is to move to a hot dry climate for at least 2 weeks – preferably longer. These climates, such as the Mediterranean, are free from most chemicals. Unfortunately, most of our houses are contaminated as a result of heat saving measures (central heating, carpets, cavity wall insulation, double glazing etc). Furthermore, where the humidity is below 40%, no moulds can survive. Neutralisation/provocation can be useful to diagnose mould allergy.

Other clues that the environment is a problem:

- Feel better away on holiday
- Feel better out of doors
- Feel better in the summer than the winter (no central heating, windows open)
- Feel better at the Coast (where prevailing winds are on-shore and so free from moulds and pollution)
- Feel better for environmental clean up – getting rid of smellies and chemicals in the house, avoiding cosmetics, eating organic food, air filtration system, dehumidifier. The Healthy House has an excellent range of products to help you do this – see www.healthyhouse.co.uk tel 01453 752216 fax 01453 753533.

Some of my patients have to move house in order to recover – this is especially true if they live near polluting industry, pesticide spray drift, near a busy road, in a damp area.

Get mould allergy tested – either by skin tests (reasonably reliable but skin scratch tests unhelpful – must do this by intradermal injection i.e. neutralisation) or by going abroad to a warm dry climate ideally for one month, but two weeks may give you an idea. Make sure that place is chemically clean – not easy. Reduce moulds in the environment with a dehumidifier – measure humidity – get down to below 40%

MCS - Multiple chemical sensitivity - Suspect if symptoms better out of doors, better in the summer, better away on holiday. Do chemical clean up. Eat organic where possible. Check with the QEESI questionnaire. Test by LYMPHOCYTE SENSITIVITY testing.

Consider desensitisation such as neutralisation or my preferred technique enzyme potentiated desensitisation (EPD) for foods and possibly chemicals. EPD does not work so well for mould allergy.

For severe mould and/or chemical sensitivity the only answer may be to move to a hot dry climate.

Electrical sensitivity. There is no doubt that for some people this is a major problem. We can now test for this thanks again to the brilliance of John McLaren-Howard. Again he uses LYMPHOCYTE SENSITIVITY tests but does these within and without an electrical field. Those people with electrical sensitivity have their allergies to chemical greatly enhanced. Healthy House supply a number of very useful products to identify where the electrical stress is coming from together with materials which block it.

There are some treatments which work occasionally and are worth considering:

- Healing - Local healers can be found from 0845 1232767 (local rate line). Consider Healing with Seka Nikolic - expensive but effective. Contact either the Tailesh Centre of Oriental Medicine, 7 New Court Street, London NW8 7AA, tel: 0207 722 3939 or The Hale Clinic, Park Crescent (just off the Marylebone Road), London, tel. 0207 637 337
-
- Geopathic stress is sometimes important
-
- Guaifenesin – may be worth a try if fibromyalgia is the main problem but I have only seen two patients who have been improved by this.

Everybody gets better from CFS in a different way – almost always a combination of the above. Tackle your illness from every angle you can. Always have a plan. Always keep a light at the end of the tunnel. Keep talking with other sufferers – they will give you ideas and inspiration.



Going on the regime makes you feel worse.

In order of likelihood the symptoms are:

Carbohydrate addiction withdrawal symptoms. – this is the commonest reason for worsening on the Stoneage diet. People who have carbohydrate intolerance can get withdrawal symptoms lasting for several weeks. The dietary regime is a counsel of perfection, go into it gradually and tighten up on it slowly to avoid the worst withdrawal. Be aware that fruit and fruit sugar can make symptoms of hypoglycaemia much worse so do not rely on fruit to keep your blood sugar up – it may do the opposite! See HYPOGLYCAEMIA.

Detoxification reactions – as soon as one takes supplements and eats a Stoneage diet, takes probiotics one will trigger a detox reaction. All these interventions displace toxins from “safe” areas such as fat where the body tucks them out of the way and mobilises them into the blood stream prior to elimination through the liver and kidneys. This causes an acute poisoning effect. Again the advice is to relax the regime and maybe consider other detox regimes which draw toxins out through the skin – such as FIR INFRA RED SAUNAING. Also see DETOXIFICATION.

Allergy withdrawal symptoms - it is normal for somebody with allergy symptoms to get withdrawal symptoms when they initially do the diet – the common allergens cause withdrawal for four days, but wheat can cause withdrawal symptoms for up to a month.

Detoxification reactions

Allergy to the supplements. Since starting patients on these regimes, we have had some who are intolerant of D-ribose (because it is derived from corn and there will be small amounts of corn antigen in the sugar), Co-enzyme Q10 (some are soya based, some sunflower oil based so try a different preparation), Acetyl L-carnitine (in which case you have got to eat more meat!) and

sometimes NAD (B3). It is common for people not to tolerate my physiological mix of minerals (MMMs). However, whatever the problem, the key is to go back to that regime on which you felt reasonable, then reintroduce things slowly one at a time. Some people do not even tolerate this which makes it most likely that they suffer from multiple allergy, in which case they are going to need desensitisation from one of the doctors listed below. For some reason often people with the worst deficiencies react badly to the very supplements they need. In this case one just has to start with very tiny amounts and build up slowly.

Candida problems - people who have a candida problem may be made worse by large doses of D-ribose. This is because this 5 carbon sugar could be converted back by the body to a 6 carbon sugar which yeast can ferment. The key here is to reduce the dose and take small amounts regularly through the day so that it is quickly absorbed and does not hang around in the gut to get fermented. See YEAST PROBLEMS

Common Complications

Osteoporosis - all people with CFS are at risk of osteoporosis because they cannot exercise. If you are over 50 with CFS or have had CFS for ten years. Ask for a bone density scan. Osteoporosis is assumed to be a one way process of bone loss – not the case! This can be stopped and reversed with appropriate nutritional supplements! See OSTEOPOROSIS

Anaesthetics – this is a problem for CFS sufferers with multiple chemical sensitivity - see ANAESTHETICS in MCS

Pregnancy – see CFS and PREGNANCY



Your GP will not do the things that are being asked of him/her.

If you need magnesium or B12 by injection, then I am very happy to supply you with whatever is necessary. However, **I have to write to your GP and inform him that I am doing this**, so that if he has any reason to object then he can get in touch with me directly. Should this situation arise, please, **let me have your medical history and/or a completed medical questionnaire** (please request from the office – can be sent to you in the post or by e-mail) and I will write to your GP (and that letter costs £25).

With magnesium and B12 injections you have two options –

- either you need to find somebody competent, such as a nurse or a private doctor, who will give you these injections;
- or you need to find somebody competent such as a nurse, a diabetic on insulin, or whatever to show you how to self-inject.

If a nurse needs a letter from me confirming that I take clinical responsibility for the treatment, then please ask the office for such a letter. **In any event, I need a letter from you stating that you have such a competent person to assist you with the injections.** I can then send you the magnesium, the B12, the syringes, needles and sharps disposal box to do the necessary.

If your GP is not willing to prescribe thyroid hormones, then I would be able to do so, **ON THE CONDITION THAT** either your GP or a thyroid specialist agree to monitor your thyroid function

regularly to check that you remain EUTHYROID; that is to say, you do not have any symptoms of thyrotoxicosis. These symptoms and signs would be: racing pulse, tremor, undue anxiety, undue sweating, irritability, unexplained weight loss, unexplained loss of muscle, unexplained osteoporosis, bulging eyes (exophthalmos) or unexplained goitre.

If you cannot find a doctor who can state that you are euthyroid, then you would need a half hour appointment with me here in Mid Wales to initiate thyroid hormone prescribing, **OR** I would refer you to a local specialist, such as Dr Skinner in Birmingham.



How Long Before You Recover?

Everybody asks me this question! The key point is that CFS is a symptom and once you can identify the underlying causes and correct these and allow time for recovery then you will improve. If you do not then it is back to the drawing board. It also depends how you define recovery. If you mean that you want to get back to how you were before the illness struck, then the answer is probably never. This is because you will simply set up the same conditions which made you ill in the first place.

People who get better from CFS are those who are prepared to make changes. These changes are often painful - changes to diet, personal relations, jobs, attitudes, desires, living environment and so on. If you are not prepared to make changes, recovery is unlikely.

Most CFS sufferers come to me hating themselves. They hate themselves because they can't function as they used to. People have to learn to love themselves as they are, and to be grateful to the illness for allowing them to make changes that make them better people to be with. The people who are best at making such changes get better fastest.

Having said all that, how quickly one gets better depends on what it is that is making you ill. I have some patients who improve simply by taking supplements, or by sleeping better, or by eliminating certain foods from their diet. Increasingly I am finding the detox regimes important -this is a reflection of the increasingly toxic world in which we live. Usually however it is a combination of these factors. It seems to me that everybody seems to get better in a different way and I am constantly being surprised! This is part of the fascination of treating CFS!

I am painfully aware that having CFS usually prevents one from earning a living. Therefore the treatments I suggest start off with the "cheap and cheerful" and progress onto those which are more expensive or difficult. This is the reason why I put EPD right at the end – because it is time consuming and expensive. However in my NHS practice I used to start on EPD soon because the treatment was free and allergy so often gets in the way of recovery. It is possible for your GP to prescribe EPD. Furthermore increasingly I have patients referred to me by their GP but funded by their Primary Care Trust – ask your GP if he is prepared to make such a recommendation. GPs are the gatekeepers to all benefits within the NHS.

Expense of treatments always must be taken into account when thinking about alternative treatments – I have seen many patients who have spent large amounts of money on illogical treatments.

The pattern of recovery is first to get the regime as tight as possible with respect to pacing, sleep, diet, supplements, hormones, detoxing, hyperventilation, desensitisation and so on. Then I like to see people feeling fine at rest. THEN wait until one feels consistently well at rest, ONLY THEN dare one try a gentle graded activity programme. However if during the course of this symptoms recur, or there is delayed fatigue then one must reduce activity accordingly. Most people come to see me "booming and busting" which is a recipe for disaster.

Dealing with doctors

There are very few doctors who recognise that CFS exists, of those only a minority actually understand the devastating nature of the illness and a very few of those have any idea how to treat it. Unfortunately the view of the psychiatric field headed by Simon Wessely (who has achieved this by endlessly quoting his own studies and ignoring those which do not accord with his thinking) prevails, which is that all you need to do is give a few antidepressants, cognitive behaviour therapy, graded exercise and bingo – a cure is round the corner. The psychiatric key to getting these results is make the patients exercise at the expense of all other activity, then don't follow them up long enough to see the relapse. Indeed this is the view supported by Government, Insurance and Pension schemes who would find it impossible to properly fund the correct treatment of CFS and compensate those individuals poisoned by their occupations. The irony is that some short term investment in the correct early recognition and treatment of would result in huge long term savings!

So do not expect any miracles from your GP. The problem is that the GP is the gatekeeper to all NHS services, benefits, social support etc, so you need him on your side. With a fully co-operative GP and this book, you can do almost everything which I can offer. A list of practitioners available from www.ecomed.org.uk

Most doctors do not distinguish, indeed do not want to distinguish, between fatigue and frustration vs sadness and depression. If you burst into tears with frustration at the total lack of understanding that merely reinforces the universal diagnosis of depression. Nearly all CFS patients react adversely to “normal” doses of antidepressants and so they stop them. This is then used as evidence of lack of co-operation in a difficult patient. Indeed, it is this “battle of belief” which has to be waged at every doctor-patient meeting which is so exhausting for CFS sufferers.

Because doctors do not diagnose any more, i.e. they do not look for causes of ill health, they will be unsympathetic to possible toxic causes of CFS. They receive virtually no training in nutrition at medical school so expect no help here. Most of them do not accept that food allergy exists, which makes desensitisation seem daft to them. Most have no idea of the many functions of magnesium but on the basis of complete ignorance will tell you that magnesium injections are dangerous. Because they only use B12 for preventing pernicious anaemia, you will be told that 2mgs a week is an overdose. They do not realise the huge potential of B12 as an instant antioxidant. Because they are used to diagnosing hypothyroidism on a TSH they will refuse to do a T4. If your GP tells you that he wants to consult with colleagues before sanctioning a treatment, then the battle is already lost.

They will ask for evidence of success for these treatments. However the best results come from a package of treatment which includes all the above factors. Such a package is not amenable to the traditional method of assessing treatments, namely the placebo controlled double blind trial (perfectly suited of course to testing drugs and considered the only truly “scientific” method). However one doctor, Dr Teitelbaum has researched this package of treatment. Although he and I have never met or corresponded (except indirectly) the package of treatment he offers his patients is remarkably similar to mine – namely diet, nutritional supplements, pacing, attention to sleep, correction of hormone levels, probiotics etc. By following up a group of patients with this active treatment comparing them to a placebo group (counselling only) he has clearly shown substantial improvements due to these physical interventions.

To my mind the only trial which is relevant is patient response. My patients get better and this is why I currently have a six month waiting list for new patients.

Doctors argue endlessly about what we should call CFS. There are lots of other names: myalgic encephalitis, fibromyalgia, post viral syndrome, neurasthenia. These are not really diagnoses, simply descriptions of clinical patterns. Whilst the experts argue about names I am only interested in getting sufferers better. CFS is not a diagnosis but a symptom which may have many causes. The name of the game is to work out the underlying cause. The problem with Western Medicine is that doctors do not diagnose any more. They treat symptoms with symptom suppressing drugs instead of getting to the root cause of disease. This arises as a result of original thinking in medicine being driven by the pharmaceutical companies. The best policy for drug company profits is to have a population of sick people requiring medication for life – so never diagnose and cure – that's bad for business. The multinational pharmaceuticals dictate to the doctors, medical journals and government and treatment guidelines are set up accordingly.

THE KEY FACTOR IS TO REMEMBER THAT CFS IS A SYMPTOM, NOT A DIAGNOSIS AND A GOOD HISTORY COMBINED WITH THE TESTS AVAILABLE CAN TELL US WHERE THE BIOCHEMICAL PROBLEMS LIE.

However if you do have a doctor who is willing to learn, then the scientific background to this work can be found in:

- Environmental Medicine in Clinical Practice, price £43 available from the British Society for Ecological Medicine (BSEM), previously the British Society for Allergy, Environmental and Nutritional Medicine (BSAENM), c/o New Medicine Group, PO Box 3AP, London W1A 3AP
- Tel: 0207 100 7090
- Effective Allergy Practice cost £5
- Effective Nutritional Medicine cost £5
- Multiple Chemical Sensitivity cost £10
- The Journal of Environmental and Nutritional Medicine
- Clinical Pearls – this monthly paper goes through the world literature pertaining to nutrition – makes for excellent reading.

If a medical practitioner wishes to join the BSEM, which gives easy and cheap access to these publications, please telephone the above number and ask to speak to Christina Winters. The website address is www.ecomed.org.uk, email: info@ecomed.org.uk The website also has a list of doctors who practise Ecological Medicine.

CFS Ability Scale

The fatigue in CFS is both mental and physical. For some sufferers, the physical is the greatest burden and for others, the mental fatigue is most troublesome.

100: No symptoms with exercise. Normal overall activity. Able to work or do house/home work full time with no difficulty.

90: No symptoms at rest. Mild symptoms with physical activity. Normal overall activity level. Able to work full time without difficulty.

80: Mild symptoms at rest. Symptoms worsened by exertion. Minimal activity restriction needed for activities requiring exertion only. Able to work full time with difficulty in jobs requiring exertion.

70: Mild symptoms at rest. Some daily activity limitation clearly noted. Overall functioning close to 90% of expected except for activities requiring exertion. Able to work/do housework full time with difficulty. Needs to rest in day.

60: Mild to moderate symptoms at rest. Daily activity limitation clearly noted. Overall functioning 70% to 90%. Unable to work full time in jobs requiring physical labour (including just standing), but able to work full time in light activity (sitting) if hours flexible.

50: Moderate symptoms at rest. Moderate to severe symptoms with exercise or activity; overall activity level reduced to 70% of expected. Unable to perform strenuous duties, but able to perform light duty or desk work 4-5 hours a day, but requires rest periods. Has to rest/sleep 1-2 hours daily.

40: Moderate symptoms at rest. Moderate to severe symptoms with exercise or activity. Overall activity level reduced to 50-70% of expected. Able to go out once or twice a week. Unable to perform strenuous duties. Able to work sitting down at home 3-4 hours a day, but requires rest periods.

30: Moderate to severe symptoms at rest. Severe symptoms with any exercise. Overall activity level reduced to 50% of expected. Usually confined to house. Unable to perform any strenuous tasks. Able to perform desk work 2-3 hours a day, but requires rest periods.

20: Moderate to severe symptoms at rest. Unable to perform strenuous activity. Overall activity 30-50% of expected. Unable to leave house except rarely. Confined to bed most of day. Unable to concentrate for more than 1 hour a day.

10: Severe symptoms at rest. Bed ridden the majority of the time. No travel outside of the house. Marked cognitive symptoms preventing concentration.

0: Severe symptoms on a continuous basis. Bed ridden constantly, unable to care for self.

This is the scale I use in conjunction with the mitochondrial function scores to help assess the levels of disability in CFS.

Helpful organizations – support for patients and doctors

Getting Benefits

Recovering from CFS is expensive! Apply for benefits if you qualify – this provides essential funds to spend on your recovery programme. The benefits worth looking at are:

- Incapacity benefit – for patients unable to work
- Disability Living Allowance – for extra money to help with disabilities which prevent patients caring for themselves – this is made up of a care and a mobility component. There is huge variability from region to region as to who gets and who does not. If you are unreasonably turned down, ask for the reasons why including a copy of the examining doctors report. Ask for help from Citizens Advice Bureau, or a solicitor. I can help with supporting letters, but there is a charge for reports. Please phone the office and ask for Caroline (one of my secretaries). The mitochondrial function test is very useful because this gives an objective measure of fatigue which cannot be argued with – the scientific paper to support this has just been published (Jan 2009) in the International Journal of Clinical and Experimental Medicine – see <http://www.ijcem.com/files/IJCEM812001.pdf>

Further information and support for patients

Go to One Click run by Jane Bryant <http://www.theoneclickgroup.co.uk> who have an excellent and informative email newsletter to keep you abreast of the latest ideas in helping CFS sufferers.

Organophosphate Users Support Group OPUS

This is the charity I have helped to set up to support people with OP poisoning on the Welsh Borders. Membership is free. Write to The Rev Nick Reid, The Vicarage, Lydbury North, Shropshire, SY7 8AU for an information pack.

www.rs-opus.co.uk

Aerotoxic Pilots – see www.aerotoxic.org

The Samaritans a nationwide charity providing confidential emotional support to anyone in a crisis. Tel: 08457 90 90 90 – 24 hours a day, 7 days a week. E-mail: jo@samaritans.org
website: www.samaritans.org They also have over 200 Branches across the UK and Ireland, ask the Operator for local Branch numbers or look in the phone book.

Suicide is a real risk for severely afflicted CFSs, especially when their illness is trivialised and dismissed by ignorant doctors.

Further information and support for doctors

British Society for Environmental Medicine (BSEM) - contact Christina Winters, c/o New Medicine Group, PO Box 3AP, London W1A 3AP; tel: 0207 100 7090

Website: www.ecomed.org.uk

Practical considerations

I would like to make clear my potential role in your process of recovery if you decide to follow my advice. I appreciate that it can be a daunting task to make a start and this is why I have made my advice as structured and clear as I can. This means that you start with the *MITOCHONDRIAL FUNCTION PROFILE* test to confirm your diagnosis and identify physical problems with your energy production. The letter of interpretation contains full details of the diet and other lifestyle interventions necessary based on your questionnaire.

To order any test

To order any test mentioned in the book, please send a completed medical history (MEDICAL QUESTIONNAIRE available from the website or by contacting the office) together with your payment. For example, for the *Mitochondrial function profile* send a cheque for £295, i.e. £225 for the tests and £70 for my letter to your GP, made payable to Sarah Myhill Limited) to my office at Upper Weston, Llangunllo, Knighton, Powys LD7 1SL and a test kit will be sent out to you. We now have a credit/debit card facility in the office so you can phone up, order the test and pay for it at the same time if you prefer. The price for my letter reflects the fact that in that 10 - 14 page letter I interpret 7 separate tests as well as giving advice about all the various health problems reported in your questionnaire.

What I can and cannot supply you with

My philosophy is to try to supply all my patients with as much information (free on my website) as is necessary to get them well, together with the best possible value supplements. As a doctor, I am allowed to supply patients with supplements in a way that cuts out a lot of the red tape and bureaucracy and therefore makes them very cheap. Once you have sent me a history, questionnaire, done tests and your GP has received a letter then **effectively you become my patient for the purpose of prescribing only**, which allows me to supply you with the necessary in order to get well – the only downside is that I have to keep your GP informed and there is a cost for such letters.

The major logistical problem I am running in to at the moment is a simple numbers game. I have so much happy feedback from people doing these regimes and taking the tests that I am currently being overwhelmed with requests for tests. This means that I cannot provide the full back up service to everybody that I would most like to provide. If you find that even with all the advice contained in this book you are not making enough progress, please, choose from one of the following doctors who understand the issues addressed in this handout.



Practitioners trained to treat CFS

It is not possible for me to personally advise and follow up everybody who requests the mitochondrial function tests through the website and who has received my detailed letter of interpretation. Therefore I run training days at my home for Practitioners of ecological medicine, in which we go through this test and its implications in detail. Should anyone wish to have further input into the implications of this test and/or implications for further management, then the following practitioners will be speaking the same language.

Dr Charles J Forsyth MBBS FFHom

Specialist areas: Nutrition, Allergy, Environmental medicine, Homeopathic medicine (clinical supervisor for the Faculty of Homeopathy). Recognised for benefit purposes by most Medical Insurance companies (eg

BUPA, PPP). Fees between £135 and £150 per hour. Full details on website: www.dr-forsyth.com
North Cottage, Dovers Green Road, Reigate, Surrey RH2 8BU Tel & Fax: 01737 226338
Office e-mail: office@dr-forsyth.com
Surgeries held in: Reigate, Banstead & Croydon, Surrey + Biolab Medical Unit (Central London).
Desensitisation available (intradermal provocation neutralization skin testing for food, chemical and inhalant sensitivities) at Banstead clinic

Dr Nicola Hembry

Dr Nicola Hembry, Litfield House Medical Centre, 1 Litfield Place, Clifton, Bristol, BS8 3LS;
Tel: 0117 317 1460, Fax: 0117 973 3303, , www.drhembry.com info@drhembry.com
Areas of interest: CFS, cancer, nutritional medicine

Dr Chris Dawkins

Dr Dawkins has been an NHS GP for many years and has been working in the field of nutritional and environmental medicine for several years.
The Breakspeare Clinic, Shipton Road, Milton under Wychwood, Oxon OX7 6JP Tel: 01993 830913

Keith Dunbar MBChB

Practises in Norfolk, contact e-mail: k.dunbar@virgin.net

Keith trained as a doctor, qualified in 1969, and was a GP for 20 years. He has not practised for about 20 years because of ME/CFS (and is no longer a registered doctor). He has recovered sufficiently using Dr Myhill's regime to be able to use his past experience both as doctor and patient to offer support and guidance to others following the same regime. However, he cannot prescribe or formally refer patients elsewhere. He has considerable experience of being at the receiving end of numerous complementary therapies and knows at first hand the frustration that ME sufferers experience in their quest for recovery. Fees: £30/hour - telephone consultations welcome.

Dr Jens Rohrbeck

Dr Rohrbeck qualified in medicine at the University of Bonn in Germany. UK qualifications: G P, DRCOG, M.Phil. Med, Diploma in Nutrition. Member of the British Society for Ecological Medicine.

Helios Medical Centre, 17 Stoke Hill, Stoke Bishop, Bristol BS8 1JN mob: 07954413010,
Email address: info@dr-rohrbeck.com

Dr Rohrbeck uses nutritional therapy, diets and drug therapy, where necessary, to stimulate and improve the body's natural defences against disease. Conditions that can be improved by treating the above mentioned problems include: Arthritis, Rheumatism, Asthma and Eczema, Chronic Fatigue, M.E., Fibromyalgia, Depression, Blood Pressure, Hyperactivity, Irritable Bowel Syndrome & Colitis, Menstrual and Menopausal Disorders, Migraine, Headaches.

Consultation Fees: Initial consultation (60-90min) £100, Follow-up: £90.00 per hour, (¾ hour - £65.00, ½ hour - £45.00); Telephone Consultations: £20 every 15min

Rosalind Blackwell ND MRN MNIMH MCPP LCSP(Phys)

The Barn, Crickham, Sedmore, Somerset. BS27 4JT – Tel: 01934 733040 or 02071 930104. Email: info@thebarnpractice.co.uk - Qualified in naturopathy, herbal medicine and manipulation, Rosalind specialises in endocrine problems, chronic fatigue and other cases of chronic ill health. She has been practising for 20 years and has done additional training during this time. Rosalind uses a traditional and 'progressive' naturopathic approach to modern problems. This incorporates environmental medicine with detoxification procedures and nutritional medicine with the use of plant extracts to correct the hormonal 'terrain'. She utilises practical sessions in the clinic. Rosalind is shortly starting an MSc in Nutritional Medicine at Surrey University. First appointment approx. 1 ½ hours at a cost of £75.

Jacqui Footman BA(hons) PGCE NLP

Turning Point Clinic, 1 Oakland Place, Off South Street, South Molton, North Devon E36 4AD. Tel: 01769 572207. Email: jacqui@free2Bme.co.uk Website: www.free2Bme.co.uk - Main area of expertise is EFT,

Emotional Freedom Techniques, which is a technique that people can learn to do for themselves as well as working on their issues with a practitioner's support. EFT can be learned over the telephone. Jacqui is experienced in helping supporting and informing people with ME/CFS. Price per session: Telephone - £35, Clinic - £45.

Rosemary Lawrence

The Bath Practice, Turning Point Clinics, 26 Monmouth Street, Bath BA1 2AA and Turning Point Clinic, 1 Oakland Place, South Street, South Molton, Devon EX36 4AD. Tel: 01769 574833. Email: rosemarylawrence@hotmail.co.uk -Rosemary's qualifications are: Diploma Bio-Electric Function Diagnostic – (electro-acupuncture), Cert. Clinical Homoeopathy, Diploma Therapeutic massage. She has a special interest in chronic illnesses in general, ME, RA, IBS, hormonal disturbances and allergies. Consultation fees: **Bath:** initial consultation ¾ to 1 hour - £50. Follow up ½ hour sessions - £40. Children and concessions £30. (Negotiable in cases of hardship). **Devon:** Initial consultation - £40. Follow up - £30

Jonathan Lawrence BA(Open 1981)

Addresses as Rosemary above. Email: jon_lawrence@hotmail.com - Jonathan has a Diploma in Osteopathy and has been working with ME patients since 1987 specialising in osteopathy and cranial osteopathy. He has personal experience of CFS and works with other practitioners both complementary and orthodox especially homotoxicology, herbs and acupuncture. Price per session: initial 45 minutes - £40 (Devon) £48 (Bath), subsequent sessions of 30 minutes - £30 (Devon) £38 (Bath)



Other practitioners of ecological medicine (Allergy, Environmental, Nutritional)

You can contact them in the first instance for an appointment if you do not wish to start with the mitochondrial function test

Dr N Avery, The Natural Practice, 106 Stockbridge Road Winchester Hampshire SO22 6RL Telephone: 01962 856310, email: enquiries@thenaturalpractice.com , Web-site: www.thenaturalpractice.com .

He also sees patients in Eastbourne at: 14 Denton Road Eastbourne East Sussex BN20 7SU, Telephone 01323 729159

Dr P Chohan, 24 Ten Shilling Drive, Westwood Heath, Coventry CV4 8GV 02476266370

Dr D Freed, 14 Marston Road, Salford, Manchester M7 4ER 01617956225

Dr Nicola Hembry, Litfield House Medical Centre, 1 Litfield Place, Clifton, Bristol, BS8 3LS
Tel: 0117 317 1460, Fax: 0117 973 3303, www.drhembry.com info@drhembry.com

Dr Patrick Magovern, Drummartin Clinic, 3 Drummartin Road, Goatstown, Dublin 14 Tel: 01 296 5993
Fax: 01 296 6189

Dr J Meldrum, Mulberry House, 13 Inverleigh Road, Edinburgh H3 5LS 01904 691591
and Nutrition Associates, Galtres House, Lysander Close, York YO3 4XB 01904 691591

Dr Franziska Meuschel, The Diagnostic Clinic, 50 New Cavendish Street, London W1G 8TL
Tel: 020 70094650 Fax: 02070094671 (will resume work following maternity leave in February 2010)

Dr J Moran Holistic Medical Centre, Wimpole Street, London W1G 8YA 02079354870

Dr P S Mukherji, 66 Pentland Terrace, Braids, Edinburgh EH10 6HE 01314455668

Dr J Nevison, 33 Wedon Way, Bygrave, Baldock, Herts. SG7 5DX 01462894743

Dr Shideh Pouria, The Burghwood Clinic, 34 Brighton Road, Banstead, Surrey SM7 1BS
Tel: 01737 361177 info@burghwoodclinic.co.uk

Dr J C Roberts, Lancaster and Lakeland Nuffield Hospital, Meadow Side, Lancaster LA1 3RH
01524 62345 CFS/ fatigue states – GP referrals only

Dr J Thompson, 40 Ragstone Road, Slough, Berkshire SL1 2PX 01753775545

NEVER, EVER GIVE UP!

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NEVER, EVER GIVE UP!



from the BOSS